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SYMPOSIUM ON LIGHT

Heart Diseases in Public Health
Chesley

Research in Trachoma
Royer

Diphtheria Carriers
Beattie and Herron

FIFTY-FIFTH ANNUAL MEETING
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HEART DISEASE PREVENTION BY STATE HEALTH DEPARTMENTS*

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BEFORE OUTLINING a program for state health departments for the study, prevention and relief of heart disease we should get better acquainted with the American Heart Association, become familiar with the *American Heart Journal* and study the works and findings of eminent cardiac specialists.

In Canada and in the United States there are many incorporated heart associations and one of our responsibilities is to coöperate with the national association through the local societies. If no local society exists in the state or province, the health officer should interest the medical profession in the organization of one.

The laity is gradually becoming educated to the importance of heart disease. Public interest is being aroused by the frequent publication of articles on the subject in our semi-popular magazines and health literature. The excellent article, "Heart Disease Communicable, Curable, Preventable," by Dr. Haven Emerson, appearing in the *Survey Graphic* of November, 1924, set people thinking. *Hygeia* has carried several articles and one of the most widely read titles of the National Health Series is the volume, "Taking Care of Your Heart," by Dr. T. Stuart Hart.

Short excerpts from published articles and addresses reveal startling facts about heart disease.

Sir Arthur Newsholme in the New York City Health Department's *Weekly Bulletin*, April 17, 1926, states in part:

> It is quite certain that a high proportion of the total deaths registered as due to cardiac disease are preventable. In England and Wales in 1920, 11.4 per cent of total deaths were thus returned in the Registrar General's reports and 8.8 per cent were returned as due to diseases of blood vessels; the nearest to these 2 being 9.4 per cent of total deaths caused by cancer, 9.1 per cent by tuberculosis (all forms), 8.0 per cent by pneumonia, and 8.0 per cent by bronchitis.
>
> That a large proportion of the deaths from circulatory diseases are preventable is shown by their age-incidence. Thus of the total deaths from cardiac diseases at all ages 26.9 per cent occurred at ages under 45, and 37.6 per cent of the total in the next 20 years of life.
>
> The best way to diminish cardiac disease is to double public health expenditure wisely directed toward increased child hygiene, increased school hygiene, and increased adolescent hygiene.

Dr. Hermann M. Biggs, in his last public address,[1] summarizes in 11 brief paragraphs some of the most important health objectives, and 9 of the 11 have definite application to the problems of heart disease.

Dr. E. W. Dwight[2] told the Association of Life Insurance Presidents that "pre-

* Read before the Conference of State and Provincial Health Authorities of North America at the American Health Congress at Atlantic City, N. J., May 22, 1926.

vention and relief of heart disease is the next job in preventive medicine."

"Physical Defects as Revealed by Periodic Health Examinations,"[3] by Louis I. Dublin, Eugene Lyman Fisk and Edwin W. Kopf, contains some very valuable information about heart disease. The authors claim that thorough physical examinations must be made to discover impairment or disease of the heart. Quoting from their conclusions:

Most of the defects and impairments discovered in the younger ages of adult life are subject to effective control.

Perhaps the most helpful prospect is in the field of weight control. Marked overweight is associated with serious impairment of cardiovascular function, and this suggests that recognition and control of excess body weight may lead to a sharp reduction in the actual number of individuals with embarrassed hearts and blood vessels.

The next important step for preventive medicine is to secure facts which will firmly establish the effective control of diseases of the heart, blood vessels and of the renal tract.

FINDINGS IN HEART DISEASE

In "Statistical Aspects of the Problem of Organic Heart Disease,"[4] Dr. Dublin interprets the findings of the Industrial Department of the Metropolitan Life Insurance Company, and points out the necessity for gathering information on the morbidity of heart diseases. He refers to the work of the Life Extension Institute and to Dr. Wyckoff's analysis of the records of physical examinations of 1,000 patients in his service who showed this distribution etiologically:

About one-fourth presented rheumatic heart disease; about two-fifths, arterio-sclerotic; about one-tenth, syphilitic, and about another one-tenth, heart disease of unknown origin. The remaining 15 per cent are accounted for by a mixture of odds and ends which are not so easily classified.

In comment, Dr. Dublin says:

It would be very interesting to find out what the relative duration of these cases of rheumatic origin is in contrast with the duration of cases of degenerative heart disease.

The Census Report[5] says:

The number of deaths in 1923 from diseases of the heart, which includes titles 87 to 90 (87 pericarditis; 88 endocarditis and myocarditis, acute; 89 angina pectoris, 90 other diseases of the heart) is 170,035, corresponding to a rate of 175.3 per 100,000 estimated population, and constituting 14.3 per cent of the deaths from all causes.

In making comparisons it must not be forgotten that nearly all persons who die of heart diseases have passed middle life, and therefore the crude death rates should be used with caution and considered only in connection with the age distribution of the population.

The greatest increases among the states in the 10-year period, 1914 to 1923, are for,

California	182.1	234.2
New York	202.5	247.4
Vermont	227.4	269.8
Maryland	169.5	210.8
New Jersey	170.4	209.1

Statistical data are necessary to our program and are readily obtained, but they should be interpreted by the statistician and the heart disease specialist before we use them in the campaign of education.

Would it be worth while for the American Heart Association to make a thorough study and investigation of conditions relating to heart diseases in the 2 states showing the highest rates in 1923 and the 2 showing the lowest rates?

	Approximate Population	Rate
Vermont	350,000	269.8
New Hampshire	447,000	255.1
Idaho	470,000	86.1
Wyoming	200,000	83.5

In addition, the territory of Hawaii represented here by our vice-president, Dr. F. E. Trotter, presents an interesting problem. The territory had an estimated population, June 30, 1925, of 323,645.[6] In 1925 when the crude death rate was 12.74 per 1,000 population, diseases of the heart stood fourth in rank, as shown in Table I.

In the territory there are only 169 physicians, and 29 are employed by the government. School medical inspection is compulsory and in 12 months ending June

TABLE I

1925 Rank	Causes of Death	Total Deaths	Rate per 1,000 Population
1.	Diarrhea and enteritis (under 2 years)....	518	1.64
2.	Tuberculosis (all forms).....	404	1.28
3.	Bronchopneumonia....	340	1.08
4.	Diseases of the heart	331	1.05
1924	Diseases of the heart (sixth in rank)....	248	0.82
1923	Diseases of the heart (seventh in rank)..	221	0.76

30, 1925, 23,644 school children were examined by the government physicians.

SOURCES OF INFORMATION

These facts and others which Dr. Trotter can give suggest that here is a fruitful field for study of the etiological factors and for trial of preventive measures in diseases of the heart.

Likewise the Child Health Demonstrations conducted at Mansfield, Ohio, Athens, Georgia, Fargo, North Dakota, Marion County, Oregon, and Rutherford County, Tennessee, ought to make valuable contributions to our knowledge of the etiological factors in diseases of the heart.

Dr. Haven Emerson's study[7] of scarlet fever, diphtheria and measles in the Willard Parker Hospital brings out a very important point. He says, "No information is available as to the condition of the patient at the time of discharge from the hospital because of the lack of a record of a complete medical examination on this occasion." This statement suggests that the American Hospital Association might coöperate to advantage with the American Heart Association.

Dr. E. H. Lewinski-Corwin, speaking about "Provisions for Institutional Convalescence and for the Reclamation of the Chronics," [8] said:

> Through the social service department the hospital gives effective evidence that its interest in the patient is not confined to his progress while in the institution. This responsibility should be made to extend a little further. Proper convalescence has been recognized as an indispensable part of the care of the sick. Very often the good accomplished in the hospital is wholly or partially undone by the lack of proper convalescent care. The sufferers from the various rheumatic diseases, from cardiac and vascular troubles of various kinds and degrees, those with mucous colitis and other gastro-enteric diseases who cannot carry out the required mode of life in their homes, those with affections of the neuromuscular system with leg ulcers and renal affections; orthopedic cases, and many others require the facilities of such special institutions. The hospitals can hardly shirk their community responsibility in providing for the adequate study and care of this huge group of sufferers.

Dr. Claude C. Pierce,[9] in analyzing 1,183 autopsies at the Central Islip Hospital, comments on syphilis as a factor in 120 cases of disease of the heart, 224 cases of arteriosclerosis, 8 cases of aneurism of the aorta, and 1 case of thrombosis of the abdominal aorta.

Dr. Richard C. Cabot[10] says, "A cardiac vascular lesion is an important factor in 38 per cent of all deaths." "Chronic infections (rheumatic and syphilitic) affected 665 persons," or 36 per cent, of 1,846 cases with heart lesions necropsied at the Massachusetts General Hospital. This is evidence that hospitals should coöperate in further studies of this type.

PROGRAMS SUGGESTED

To be specific 2 tentative programs[11] have been outlined by the American Heart Association for state health departments. The minimum program for a state where heart work has not been developed requires: Facts about the heart situation in the state, conduct of educational publicity campaigns, provision of heart clinics for children and adults, and study of the possibilities of work suitable for heart cases. The broader program is essentially the same but more detailed and involves more work and expense. But the real trouble with such programs, whether they relate to cancer, goiter or heart disease, is that most, if not all, the state health departments have inadequate funds for carrying on the old established routine duties and some states have no funds for educational work. But we will all do the best we can to meet our responsibilities with the means available.

For the minimum program the mortality statistics of the state by age and sex for 5 years are readily obtained. So are the figures showing the incidence of contagious diseases including syphilis. But what about the incidence of acute rheumatic fever and heart disease in children classified as preschool, in the grades, in high schools and in special study groups?

Dr. Eugene R. Kelley's plan[12] for maternal and infant hygiene work was "Investigate, educate and demonstrate, with emphasis on investigate." Apply that plan to heart disease and investigate rheumatic fever, tonsillitis, chorea and other diseases common in children but not so clearly related to diseases of the heart.

CARE DURING CONVALESCENCE

Should we not then begin to investigate, to educate and to demonstrate by declaring rheumatic fever a notifiable disease? Patients would question their physicians, the public would demand an explanation from the health authorities, interest would be aroused in all of the known causes and predisposing factors of diseases of the heart if this were done. Education would follow, for doctors would examine convalescents from all acute illnesses, and their examination of children especially would be more thorough. Mothers would try to keep convalescent children in bed longer and would guard them against exposure and undue exertion when up and about. Both the doctors and the people would recognize the need for a thorough physical examination some months after recovery, particularly of children whose return to normal is delayed. Through subsequent examinations the physicians could demonstrate the usefulness of notification in cases of rheumatism and of better care of convalescents by detecting early signs of impairment of cardiovascular-renal function and removing them by suitable treatment and hygienic measures.

In Norway I believe acute rheumatic fever is a notifiable disease.[13] If so, inquiry as to its relation to diseases of the heart and the usefulness of case reporting would be worth while. We already have some authoritative expressions on this phase of the subject.

Dr. Lewis A. Conner states:[14]

> One of the most striking things about this rheumatic type of heart damage is the fact that the younger the child is when he has this rheumatic infection the more certain he is to have damage done to the heart, whereas, if the rheumatic infection occurs first in an adult, if he gets his first attack of rheumatism at 30, he almost never gets a damage to the heart valve. The earlier the age, the more sensitive the heart valve.

Dr. Hart:[15]

> The consensus of opinion at the present time is that rheumatism is caused by germs and that these get into the body very frequently through diseased tonsils, teeth, and adenoids.

Dr. S. Calvin Smith:[16]

> It has been estimated that 20 per cent of those who suffer from rheumatic fever develop heart affections. Tonsillitis, the frequent precursor of rheumatic fever, is also provocative of heart lesions.

In Saskatchewan, our president, Dr. M. M. Seymour,[17] Deputy Minister of Health, examined 3,432 children at the baby clinics in 1924 and found 662 with diseased tonsils, 342 with defects of the teeth, and 42 with impaired hearts.

These findings, too, will be useful in his heart disease campaign.

In Massachusetts,[18] in the first year's work of the 10-year program for the prevention of tuberculosis this report was made:

> There were examined over 10,000 white school children between the ages of 5 and 15. Of these three-fifths were girls and two-fifths boys. More children were examined in the 10–15 year age group than in the 5–10 age group. Valvular heart defects were found alike in the city and country children, about 1.7 per cent. As a possible etiological factor in these heart cases, tonsillitis ranks first, scarlet fever second, rheumatism and chorea, third. Asthma was found more frequent in the rural than in the urban children. Untreated dental

caries were found more frequent by 5 per cent in the urban than in the rural children. Enlarged and diseased tonsils and adenoids were found 30.9 per cent in the rural against 26.2 per cent in the urban children.

An English specialist[19] reports that heart disease due to rheumatism is not discovered as a rule until about 11½ years after the attack of rheumatic fever. Another authority states that perhaps 15 years elapse between the initial lesion of syphilis and the detection of cardiovascular syphilis.[20]

S. D. Collins[21] of the Public Health Service, studying the incidence of certain communicable diseases among children, claims:

> By the time the adult ages were reached, about 89 per cent of the children had had measles, about 78 per cent had had whooping cough, 65 per cent mumps, 52 per cent chickenpox, 12 per cent scarlet fever, and 9 per cent diphtheria.

Dr. Haven Emerson's statement cannot be improved upon:[22]

> Cleaner mouths, fewer diseased tonsils, fewer neglected decayed teeth, earlier recognition of sore throats, and quick care in their treatment as serious infections, the considered and skilled attention to the little child with aching muscles and joints—"too young to have rheumatism" kept up and about with "growing pains"—repeated examinations of the heart after attacks of any acute infectious fever in childhood, always separation of the sick from the well; by such means will the number of acute rheumatic hearts be reduced.

What could promise more toward increasing periodic examinations of adults in the future than this plan for children? As these measures come into general use their beneficial effects will extend beyond the field of control and prevention of infectious diseases into that of personal hygiene.

Difficulties are encountered when a health officer tries to follow Dr. Newsholme's plan to diminish cardiac diseases by doubling his expenditure to increase child hygiene, school hygiene and adolescent hygiene. Ask any health officer who has tried to do it. In most states it is a fight to obtain meager appropriations for vital statistics, communicable disease control and general sanitation. But needful information may be gathered and results may be obtained through inexpensive and practicable measures by adapting present activities to the heart disease problem. For instance, 43 states have the benefit of federal aid in child hygiene work. Special instruction in the care of convalescent children with due emphasis on heart disease can be included in the child hygiene programs for mothers' clubs, for Little Mothers classes, for teachers and for students training to be teachers. Demonstration clinics for babies and children can feature the relation of diseased tonsils, bad teeth, etc., to heart disease.

Since the younger the child, the greater is the danger of heart impairment from acute infections, increased child hygiene is of first importance, for it concerns the infant and child of preschool age. Its field is convalescent care, discovery of heart impairment and of other defects through complete periodic physical examination, which must be followed up to secure treatment of diseased tonsils, adenoids, teeth, etc.

PREVENTION IS IMPORTANT

Preventable disease work is next in importance. Its field is investigation and control of communicable diseases, treatment by specific remedies—antitoxin in diphtheria and scarlet fever, Flexner's serum in meningitis, immune sera in measles, etc., arsenicals in syphilis—and establishment of active immunity by use of vaccines, sera, etc., also to advocate convalescent care in individual cases and in outbreaks.

The field of school hygiene should be extended by emphasizing the hygiene of the heart. (See Dr. Minor's 1925 School Hygiene Report.)[23] The responsibilities cited in child hygiene and preventable disease work also apply to school hygiene, but here group instruction in personal

hygiene is of special importance. A well considered program of health education covers the preceding and correlates the activities assigned to child hygiene, preventable diseases and school hygiene.

Sir William Osler, discussing the tuberculosis problem,[24] made some remarks which apply equally well to the heart problem. He said:

> The most important point in this great movement is education. There are 2 aspects to the educational problem: first, the getting of knowledge, which is not, after all, a very difficult thing to do. The second aspect is the difficult problem; making this knowledge effective; getting sense and getting wisdom; these are totally separate and distinct.
>
> There are three to educate, the public, the profession and the patient.

As the campaign against heart disease is essentially one of education, we may fall back on the schools and obtain very valuable information through the teachers, and incidentally give them correct information regarding heart disease, and through them and the children reach the mothers.

The development of a general program is a simple matter but to make this program effective in any locality is not so simple. We must first obtain the information for the locality. In 1911 in Minnesota we began to collect information in schools chiefly to aid us in epidemiological investigations and epidemic control. The means used, "A Disease Census of School Children," was found very helpful in field epidemiology.[25] It appeared to be feasible as a general measure in public and private schools and institutions. For several years the state printer supplied the disease census cards and they were used particularly in the rural schools throughout the state. The cards provided for entry of identification data of the student and his mother's statement giving the year of age in which he had certain communicable diseases which confer immunity on one attack or in which active immunity may be established by vaccination, etc., also for attacks of rheumatism and tonsillitis. We believe that the mother is the most reliable source of information, since she knows what diseases her children have had, including those which were not seen by a physician.

The records were easily obtained from the parents through the teachers who kept the cards up to date by making inquiry and suitable entries, when pupils returned to school after absence due to sickness and after vacation periods. Cards of new pupils were prepared upon entry to school. If the pupil moved from one district or from one school to another, his card went with him. Such records if kept up would be valuable in adult life especially for reference of health service physicians in colleges and of medical officers of the Army, Navy, and Public Health Service, *e.g.*, measles control.

Rheumatism and tonsillitis were included in the original list because of their relation to other diseases of childhood and to physical impairment. The sequence of rheumatism, tonsillitis, scarlet fever, etc., is shown since each attack is entered according to the age of the pupil when it occurred.

These cards have proved their worth in communicable disease work and for this alone their use is justified. The added advantage of obtaining uniform and reliable data on attacks of rheumatism, tonsillitis, chorea and other illnesses which relate to heart impairment, does not involve extra work or expense.

OBLIGATIONS OF HEALTH DEPARTMENTS

A broad view of the responsibility of state health departments includes relief as well as study and prevention of heart disease, but I prefer to limit my suggestion to obligations which every state and provincial health department can meet, as follows:

1. To know Dr. John A. Smith and his work as secretary of the American Heart Association.
2. To make acute rheumatic fever a notifiable disease
3. To increase child hygiene, preventable disease and school hygiene work as outlined

4. To obtain better care of convalescent children

5. To use some means such as the "Disease Census" for gathering uniform and reliable data suitable for study in relation to diseases of the heart

6. To broadcast through all regular channels and in every phase of routine work proper information about the causes and prevention of heart diseases

7. To help prevent heart disease through increased effort by the Divisions of Child Hygiene, Preventable Diseases, School Hygiene and Venereal Diseases

8. To ascertain the institutional facilities and needs for care of acute and convalescent heart cases and what agencies find suitable work for persons with damaged hearts

9. To arrange through the State Medical Association for at least one annual public meeting of every county medical society with "Prevention and Relief of Diseases of the Heart" on the program

10. To assist Dr. Crumbine in the splendid work for children that the American Child Health Association is doing

11. To coöperate to the best of our ability with the American Heart Association, the American Medical Association and the state and county medical societies in the promotion of periodic health examinations of children and adults.

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A SYMPOSIUM ON LIGHT*

UP TO a very recent time, very little has been known in a definite way regarding "Sunlight," particularly in its relation to life, and only within the past few years have investigators devoted time to special research on this subject.

Dr. Bunker, of Boston, touches the keynote of the whole subject in the title of his paper, namely, "Light and Life."

From the research already conducted, we have definite evidence that "Sunlight" in addition to having certain physical properties has also some definite physiological properties; that without "Light," there would be no growth; no development; no repair; in fact there would be no life.

For some time back, we have considered in a more or less general and indefinite way that "Sunlight" was an important accessory in the cure of certain diseases and in the promotion of health, but recently physiologists, physicists and physicians have been attempting to obtain more definite information as to the character and characteristics of this energy and of its method of operation.

Among the names of early investigators, Finsen and Rollier stand out prominently, in the investigation of "Light" and its application to the promotion of health.

Those whose papers follow are devoting a great deal of time and work to the study of the problems presented in the field of "Sunlight" and are entitled to speak with authority on this subject.

WILLIAM J. BELL, M.B.

LIGHT AND LIFE

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CHILDREN and scientists have at least one thing in common, a consuming curiosity as to the reasons for observed phenomena.

So much has been reported in a short span of years upon recent developments in the scientific application of light to the betterment of health and the prolongation of life and so varied have been the applications of light, that some degree of uncertainty and confusion naturally prevails as to what is proved and what is theory. It becomes reasonable then to stop and take account of our available information on the subject so that with clarified vision we may judge of future reports and developments in this important field.

All science is permeated with specious conclusions, offered as theories, which cannot of course persist since they are intrinsically false, but they nevertheless becloud the issue temporarily. Such erroneous conclusions have been drawn occasionally in regard to phenomena of light and its biological effects.

The report of a single experiment may seem to show that cod liver oil when oxidized gives off ultra-violet light. Based on this assumption, another report

* Presented before the Child Hygiene Section of the American Public Health Association at the American Health Congress at Atlantic City, N. J., May 21, 1926.

is forthcoming that chickens raised in a brooder can be made to grow faster when flasks of pyrex glass containing cod liver oil are supplied to irradiate with their emanations the birds exposed. In the first case it appeared that some emanation from a beaker of oil did fog a photographic plate. This observation was doubtless correct, but that it was ultraviolet light which caused the fogging of the plate was not a correct explanation. Other laboratories tried to corroborate the experiment but without success. Later investigation suggested that very likely some hydrogen peroxide, not carefully wiped from the *outside* of the beaker containing oil, had been responsible for the observed result, which therefore had been incorrectly interpreted as to its cause. Before this theory could be retracted the second experiment in another laboratory had been carried out. Its explanation as offered, in view of the collapse of the theory on which it was based, must also be discarded as false. Not enough data had been collected in either effort to show the true relation of cause and effect.

It behooves us, therefore, who are interested in the therapeutic effects of light to scrutinize carefully each reported observation in this field. Only repeated corroboration by different workers over periods of time will establish the true and the false.

OBSERVATIONS LEADING TO HELIOTHERAPY

Twenty-five years is a short time in which to develop a science of heliotherapy. Yet it was only in 1903 that Rollier reported the establishment of his sun bath clinic in the Swiss Alps for the treatment of certain tuberculous conditions and thus gave impetus to the study of the effect of the sun's rays upon health. Already in 1926 we are convinced that sunlight and light from other sources may be effective in the treatment of certain diseases and that exposure to light of certain kinds is effective in preventing other diseases.

Sunlight comes to us over a distance of approximately 93 million miles. Sir Isaac Newton believed that minute particles of light were transported over this long route and he offered the corpuscular theory of light transmission in explanation. He observed that light looked as though it came from the sun, and he believed that it must be matter, and since it did not appear to be a continuous string of matter he thought that it must be in finely divided particles which he named corpuscles. His observations are unchallenged but his explanation has been shown by the physicists not to fit in with facts of light behavior observed later, and his theory is now discarded.

Our present theory of light transmission seems to satisfy some of the newer requirements, but it admittedly is not a perfect explanation. There are, in effect, two theories of light transmission which are not necessarily inharmonious, the wave theory of light transmission and the quantum theory.

Any theory is at best an attempt of man to formulate in words an explanation for observed phenomena. A few such theories have stood the test of time in never failing to explain variations in the basic phenomena which inspired them. Such theories we dignify with the term "natural law." Things happen not because of natural law; rather does the natural law describe accurately the actual causes whatever they may be. Other theories less perfect in their explanations stand for a time, are amended in the light of further experience, or are discarded when proved false. Theories which have some degree of truth are useful since they often enable the scientific worker to predict things that theoretically ought to happen or exist. Such predictions are a spur to the discovery of these happenings. The theories of light have proved to be such helps to discovery.

THE WAVE THEORY

From the wave theory of light which was promulgated by Young in 1804, Clerk-Maxwell was enabled to predict 60

years later that waves of great length, but of the same nature as those which are involved in transmission of visible light, having an electromagnetic origin, must exist. After 25 years these waves were discovered, demonstrated, and measured by Hertz, and to-day similar waves are generated and broadcast from every radio broadcasting station, serving as the carriers of speech, music, or entertainment to the millions of radio listeners. Hertzian waves, wireless waves, heat waves, light waves, all are of the same nature differing only in the frequency with which one wave follows its predecessor.

Those waves which we call light waves are therefore part of a great chain of electromagnetic disturbances set up by the behavior of the ingredients of atoms of matter. Every bit of matter is a broadcasting station sending out in all directions electromagnetic waves of one length or another. Some of these waves can be tuned in and received by one kind of matter, others by other kinds; some are stopped or absorbed by various substances; some pass on through as light passes through glass, or heat through iron.

To explain the theory of wave transmission of light it is useful to employ the simile of two men, two boats and a quiet pond. Two men are fishing in the same pond each in a different boat. There is no wind to disturb the surface of the water and as they sit quietly waiting, no ripples mar the surface of the water. One of the fishermen becomes restless and shifts his position in his boat. This rocks the boat and ripples spread out over the surface of the water in circles around him. Each of these ripples is a wave. In the direction toward the other boat a succession of these waves is proceeding one after the other. As the first wave reaches the second boat it laps against its side and if the wave be large enough it faintly rocks the second boat. Likewise with the second wave and the third as it arrives, each rocks the second boat slightly. Other portions of each wave have traveled to the shores. All of these waves were caused by a displacement of the contents of the first boat from one part of it to another, resulting in a disturbance of the equilibrium of that boat.

Likewise with light waves, each is caused by a disturbance within an atom, an actual displacement of the position of one of the constituents of that atom, as will be explained later, resulting in the disturbance of the equilibrium of that atom, a disturbance which is communicated to a surrounding fluid medium, the ether.

Before proceeding further with the elaboration of this explanation, consider if you will certain things that have happened in the pond. The water has not traveled from the first boat to the second as the waves were propagated. If there were matches or floating objects between the two boats, these objects bobbed up and down as each successive wave passed, but after the wave had gone by, the floating objects were in the same relative position between the boats as at the beginning. Obviously, particles of water have bobbed up and down with these objects, or to phrase it another way, particles of water have vibrated in a plane at right angles to the direction of wave propagation.

So when light waves are propagated through the ether, the ether is subjected to vibrations in a plane at right angles to the direction of wave propagation. The more violent the original disturbance, the greater will be the height of the wave, or to phrase it again in scientific terminology, the greater the amplitude of the vibration. The amplitude of vibration of an individual wave has no relation to the time interval between that wave and either of its neighboring waves. Amplitude of vibration is a characteristic of a particular wave and need not be considered in our investigation at this time.

The water of our pond corresponds to the ether which transmits light wave vibrations. Ether is something which is postulated because we need for purposes

of logical thought something to vibrate when light is propagated. It is a theoretical substance since no one yet has measured it or seen it. Theoretically, it fills all space in the universe. It is not air because air is made up of gases and we can remove these gases from a lamp globe by vacuum pumps and yet we can propagate light waves through a vacuum. It is present in all the spaces within the molecules and atoms which make up matter. This is the best that the physicists can do for us at the present time in explaining ether. Some day it is to be supposed that our theory concerning it will be either justified or disproved. Just as in a water wave there is no translation of water as a wave is propagated, so in ether waves there is believed to be no streaming of the ether itself but rather a vibration at right angles to the plane of propagation.

Each ether wave is started by a disturbance within an atom. The disturbance is passed along much as when a child sets up a string of dominoes on edge and having tipped the first one, watches it in turn fall against its neighbor and so on until the final domino is toppled. The last domino falling can be made to ring a bell or close an electric circuit or do other work. The final effect is not dependent upon the kind of energy which is passed along the line but by the mechanism which last received the imparted energy. Nothing ponderable has been transmitted along the line from the beginning where the disturbance originated to the end where the effect was produced. So with electromagnetic waves in the ether, nothing ponderable is transmitted but an effect may be produced by the reception of the energy which has been passed along.

THE NATURE OF MATTER

To understand the nature of the causative disturbance in this chain of events which results in the sensation of light, we must consider the modern conception of the nature of matter. Matter is compounded of molecules, and molecules of atoms. Atoms appear to be made up of two kinds of particles distinguished from each other by electrical characteristics. One kind of particle has an electric charge which is preponderatingly positive, while the other kind of atomic particle carries a negative electrical charge. Each atom is in the nature of a planetary system with its positively charged nucleus occupying a central position, and its negative electrons revolving about this nucleus in orbits as the planets revolve about the sun. The space between nucleus and electrons is filled with ether. The nucleus with its positive charge is called a proton.

Everyone knows that opposite electrical charges attract each other. Therefore it is evident that there is an attraction between a proton and its electrons. Likewise the revolving electrons whirling about the central proton tend to be thrown out from it as if by centrifugal force. The balance between the attractive energy and the energy which tends to throw the electrons out determines the distance away from the proton at which the electrons remain. Anything which tends to increase the holding force will permit the electrons to speed up and to move out into more far flung orbits; likewise it can be seen that the proper application of forces will drive the electrons in toward their nucleus. Every time an electron jumps from one orbit to another, especially when it jumps to an inner orbit, there is a disturbance within the atom, just as when the fisherman moves from one end of the boat toward the center he rocks the boat. In each case there is an impulse imparted to the surroundings which makes for wave motion, be it in ether or in water. Likewise if something violent knocks an electron out of its orbit so far as to put it beyond the realm of attraction to its proton, there will be a disturbance commensurate with the splash that follows if the fisherman becomes excited and falls overboard.

By rubbing a piece of iron, its atomic electrons may be driven into new orbits, and the resulting impulses imparted to the ether result in heat waves. Heat is a

manifestation of electromagnetic vibrations just as light is. In the case of heat, the successive energy releases take place less rapidly with relation to each other than in the case of light waves. We may truly say, therefore, that the vibration frequency of heat waves is less than that of light waves, meaning that there are fewer vibrations per second to give the effect of heat than there are when the effect produced is called light. If 2 waves are created in 1 second of time, the vibration frequency is 2 per second; if 10 are produced in 1 second, the frequency is 10 per second, and so on. The frequency of visible light waves is some thousand billion times per second.

A single atom of radium explodes once in a thousand years or so and in so doing it drives a pair of electrons out of their orbits. If the projectile passes into a gas it may possibly pass through the spaces in the molecules of gas or it may register a direct hit on a proton or electron. If the projectile strikes a more solid mass of matter as for instance a target of hard metal it will cause a disturbance in the electron system of an atom of that target, as a result of which an impulse is transmitted to the ether resulting in electromagnetic vibrations being propagated in waves. Such waves would be called gamma rays or short X-rays.

By accepted definition, the distance between two wave crests is called wave length. The speed of transmission of these electromagnetic waves has been measured in a variety of ways and found to be always constant, irrespective of wave length or vibration frequency. Since the vibration frequency has been commonly expressed as so many times per second and the wave length is commonly expressed as some unit of distance, it follows that always the product of frequency times wave length equals a constant speed, the speed of electromagnetic waves. Wireless "S O S" calls are commonly sent out at a wave length of 300 meters, that is, the distance between wave crests is 300 meters in linear distance. One wave does not follow its predecessor until the first one has been propagated this actual distance. The speed of these waves is 300 million meters per second. After one second of time there will be therefore in the ether in any direction from the sending station one million wave crests each 300 meters apart, all traveling at the same speed and maintaining this distance apart, just as a column of troops marching in review maintain a definite distance each man behind his file leader. Such a series of waves considered as a unit constitutes a wave train.

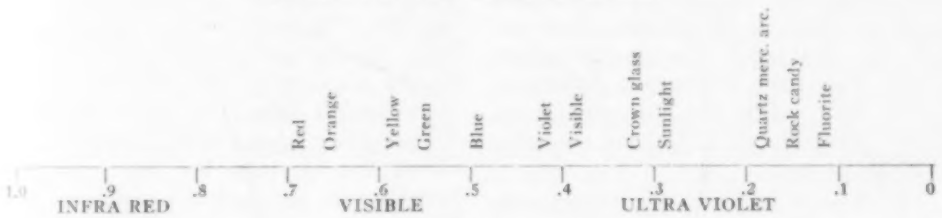
SPEED OF LIGHT

The speed of light was first deduced from visible light waves as follows. The earth revolves in an orbit around the sun at a distance of 93 million miles. The diameter of the earth's orbit is therefore twice 93 or 186 million miles. In another orbit, 500 million miles from the same sun, revolves the planet Jupiter. In a restricted orbit around Jupiter as its center, revolves a satellite. The light reflected from this satellite is visible to the astronomer on the earth through a telescope except when the satellite goes behind Jupiter. As it reappears on the other side we see it again. All these revolutions are at fixed speeds. Therefore the time that the satellite is not visible to an observer on the earth ought to be a constant time. Such does not appear to be the case. Early observers noted that at times this satellite was behind Jupiter apparently 1,000 seconds longer than at other times. Then it was observed that this hiding of the satellite appeared to be longer when the earth was in such a position that the sun is between it and Jupiter while the time of shortest disappearance of the satellite was at that season of the year when the earth is most nearly between the sun and Jupiter. In other words, when the earth is 186 million miles nearer Jupiter the satellite reappears 1,000 seconds sooner after its disappear-

THE ELECTROMAGNETIC SPECTRUM EXPRESSED IN WAVE LENGTH IN METERS

APPROXIMATE DISTANCES OR SIZES		METRIC EQUIVALENTS
Stars	10,000,000,000,000,000.	Light-years
	1,000,000,000,000,000.	
	100,000,000,000,000.	
	10,000,000,000,000.	
Planets	1,000,000,000,000.	
Satellites	100,000,000,000.	
	10,000,000,000.	
	1,000,000,000.	
	100,000,000.	Light-seconds
	10,000,000.	
Geographical distances	1,000,000.	
	100,000.	
	10,000.	
Transatlantic wireless	1,000.	One kilometer
Radio broadcast	100.	
Experimental wireless	10.	
	1.	One meter (39.4 inches)
Hertzian waves	.1	
	.01	
	.001	One millimeter
Microscopical objects	.000,1	
HEAT WAVES	.000,01	
LIGHT WAVES	.000,001	One micron (μ)
	.000,000,1	
Colloidal particles	.000,000,01	
Molecules	.000,000,001	One milli-micron ($\mu\mu$)
Atoms	.000,000,000,1	One Angstrom unit
ROENTGEN RAYS (X-rays)	.000,000,000,01	
GAMMA RAYS (Radium)	.000,000,000,001	
Electrons	.000,000,000,000,1	
	.000,000,000,000,01	
	.000,000,000,000,001	

ONE MICRON DIVIDED INTO TENTHS; THE REGION OF LIGHT IN THE GREAT SPECTRUM.



ance than when the earth is 186 million miles farther away. This showed the speed of visible light transmission to be 186 million miles in 1,000 seconds, or 186 thousand miles in one second. Various complicated laboratory experiments showed that this is always the speed of light, and not merely of visible light but of all kinds of electromagnetic vibrations.

WAVE LENGTHS

Since all electromagnetic waves are propagated at this constant speed it must be evident that there are two ways of describing all waves, one by giving their frequency of propagation and the other by describing their wave length. Either expression can be transformed into the other by simple division. The whole gamut of electromagnetic vibrations can therefore be laid out in a diagram ranging the longer waves at one end, the shorter at the other. This constitutes the electromagnetic spectrum. In this spectrum we find it convenient to designate certain bands of wave length by the names heat, infra-red, visible light, ultra-violet, X-rays, etc.

Upon examination of such a spectrum it is found that a comparatively narrow band of waves having lengths of from about .3 to .7 microns comprises the whole spectrum of visible light. In this band the longest waves give a sensation in the brain through the eye which we call red light while the shortest rays cause a sensation which we define as being violet light. In between are the other spectral colors.

Below the red end of the visible spectrum are similar waves of slightly longer wave length which do not affect the retina of the eye but which do affect receptors

in the skin giving a sensation of warmth. These are infra-red and heat rays, and include all rays from about .7 microns to 300 microns. At the other end of the visible spectrum there is a band of wave lengths shorter than violet rays which are unable to affect the eye and are therefore invisible. These are the ultra-violet rays. In the light from the sun these rays are a very narrow band from .38 to .28 microns in length. From an arc lamp there are emitted rays of still shorter length which can be designated by the kind of transparent medium which permits them to pass. Thus we have quartz ultra-violet from visible violet to about .2 microns, fluorite ultra-violet which includes everything from visible violet to about .12 microns, etc. Since these rays described include all those which have to date been demonstrated to have a therapeutic effect, we need not try to limit the lower boundary of ultra-violet. Roentgen rays are very much shorter than these, gamma rays from radioactive substances shorter still, while the shortest known waves have only recently been described as Millikan rays.

The final step in the theoretical consideration of light relates to the nature of the receiving mechanisms in the living body. About these we can as yet do little more than speculate. We know that electromagnetic waves in the general region of visible light do have an effect upon protoplasm. We believe that they can transmit energy to the atoms of protoplasm just as water waves can rock a boat. We feel reasonably sure that the protoplasmic atoms have their electronic orbits disturbed when energy is received, thus making possible collisions with neighboring electrons and so passing on the energy. We know that in general, various forms of energy can be transformed into other forms, as for instance heat can be transformed into chemical energy. We observe that in irradiated protoplasm chemical changes take place. We observe that the quantity of energy delivered by different wave lengths varies directly as the frequency, that is, the packages of energy delivered by short wave high frequency light are greater in number than the packages of energy delivered by long wave low frequency light in the same space of time. Wave length does not measure the length of the package, it measures the distance between packages. This in simplified form is a statement of the quantum theory of energy delivery.

MORE ULTRA-VIOLET RADIATION IN SUMMER

In the summer there reach the earth from the sun more ultra-violet radiations than arrive in the winter. More ultra-violet is in the sunlight arriving at a mountain top than arrives on the same day at sea level. More reaches the inhabitants of the country than the city dweller. The reason for all of these facts is essentially the same. Around the earth is an envelop of gases and dust particles, the atmosphere. The constituents of the atmosphere absorb some of the electromagnetic vibrations which have started from the sun. The layer of absorbing atmosphere is thicker between the sun and the sea level than between the sun and the mountain tops by the difference in elevation of the two. City air is dustier and smokier than country air. In the winter the sunlight arrives at more of an angle to the earth's surface than in the summer when the sun is more nearly overhead. This added angle makes a longer path through the atmosphere for each ray to traverse, hence greater absorption of light. This is especially noticeable in the ultra-violet band of solar radiations. When clouds interfere there is still greater loss.

ARC LAMPS

Any exact study of light therapy must be based upon measured dosage of known wave lengths. An artificial source of light is more dependable than is sunlight for such purposes—hence the development of various forms of arc lamps used to furnish a measurable source of therapeutic light. Most lamps have chimneys

or shields of glass. Glass is reasonably transparent to visible light but, as explained above, permits very little ultra-violet light to pass. This is why so little ultra-violet light can be obtained from the ordinary incandescent lamp such as is commonly used for lighting our houses.

Fused quartz is transparent to visible rays and to ultra-violet rays of even shorter wave length than those which reach us from the sun. This is the reason that most lamps used for heliotherapy are made of fused quartz instead of glass. The electrically operated mercury arc lamp is especially convenient and suitable for this purpose. The ordinary mercury arc lamp with a glass tube, used for lighting purposes, generates as much ultra-violet as the quartz lamp but the valuable short rays are held back by the glass while they are passed by quartz. Fused quartz lamp globes are too expensive for ordinary household use, but some experimentation with their use has been undertaken. The results are not yet available to permit drawing any conclusions.

PHYSIOLOGICAL EFFECT

The action of ultra-violet light upon the physiology of human beings is especially obvious in the effects upon skin and in bringing about chemical changes in the composition of the blood. The changes in regard to calcium and phosphorus content of the blood have been taken up in other papers in this JOURNAL. There seems to be reasonable doubt about the identity of effect on the skin from light of the mercury vapor quartz lamp and from the sun. Of course, the artificial source of light delivers in a unit of time much more quanta of energy than comes from sunning. Likewise the proportion of short burning rays is greater in artificial ultra-violet light. Freiberg and others have reported that mercury arc irradiation does not produce the true pigmentation of the skin that is a concomitant of sufficient exposure to sunlight. On the other hand, the favorable effect of calcification of rachitic bones is a definite sequel of irradiation from the lamp. It is reported that an improvement in red cell count is greater after exposure to sunlight and that artificial light does not bring about an equally favorable effect. For this and other reasons some have concluded that, in the treatment of certain types of tuberculosis at least, artificial ultra-violet irradiation is not the equal of sunlight treatments.

Kisch has suggested that heat rays in the infra-red region are the valuable rays in treatment of deep tuberculosis conditions, but heat rays can pass through glass and it is admitted that sunning under glass is not the equal of direct sunlight. Hayhurst has stated categorically that heat rays have a general thermal therapeutic value because of their warming effect upon the tissues but that they do not produce specific chemical or biological effects. Leonard Hill has recently advocated the middle band of the ultra-violet region from .3 microns to .25 microns as having a desirable relation to the longer warmer rays and the shorter chemically stimulative region.

One theory advanced to explain the difference between the action of long and short ultra-violet light rays suggests that the longer ultra-violet such as is present in the solar spectrum has more penetrative power while the short ones have a more superficial effect, bring about burning, and have a more decided bactericidal power. This is probably quite true. It is easy to demonstrate that the still longer visible light waves pass through the skin. As wave lengths grow shorter the penetrative power becomes less until well into the ultra-violet region we come against an absorption zone of wave lengths which are absorbed by practically everything known. Not until we get beyond this zone into the region of X-rays do we again begin to have a passage of light rays through materials. This power of short waves to pass through substances ordinarily called opaque becomes greatest we

must assume in the case of the shortest known Millikan rays.

Attention has been focused upon the seemingly identical action of cod liver oil taken internally and ultra-violet irradiation applied externally for the cure or prevention of rickets. A recent view is expressed by Bloch and Faber that the result may be due not to any specific substance or quality common to these two therapeutic agents but to some inherent quality of protoplasmic chemistry whose inhibitions are removed by either of these two methods of treatment. It must be remembered that cod liver oil is absorbed into the body only after the processes of digestion have split the oil, even in the case of intraperitoneal injection. Any search for a factor common to cod liver oil and ultra-violet light should be directed therefore to a study of the results of lipase action upon the oil.* However, it is not necessary that there be anything in common between the two except energy available for release. It is known that oils and fats when oxidized yield heat and that heat can be transformed to chemical energy. What other forms of energy pertain to the by-products of the digestion and oxidation of this substance we cannot in complete detail catalogue. Different kinds of energy can be imparted to a system and each bring about identical results. Energy conversions are so numerous that final results tell nothing of the nature of inciting causes.

It has been shown that the exposure of certain foods, notably fats and substances rich in cholesterol, results in imparting to these foods properties which may be transferred to animals digesting these foods, with an ultimate stimulation of antirachitic metabolism. This does not however convince me that the foods themselves are antirachitic although perhaps this may seem to be splitting hairs of definition. But this much is clear, ultra-violet light may induce an antirachitic metabolism in an animal directly, or indirectly through the building up of vitaminic properties in foods.

Vitaminic potency is itself little understood. We say that vitamin A is growth promoting. Formerly we thought that the same vitaminic substance A was also antirachitic. Now it appears that the growth promoting part of A is different from the antirachitic factor and the latter has a new vitaminic letter for its designation. It has been reported by Bovie, Hess, Steenbock, and others that animals on a diet deficient as regards the so-called antirachitic, show an improvement in growth when subjected to ultra-violet irradiation. This treatment is attended with better calcification of the bones. It is proper to inquire whether the use of ultra-violet light with this result is actually growth promoting as the phenomenon has been described, or whether it is growth *permitting*. Naturally an animal that is rachitic, because of its calcium metabolism deficiency, cannot increase its stature so rapidly as one that is forming normal, solid bones. The true growth promotion is shown by the supplying of a deficiency in vitamin A to an animal which is not rachitic. Two phenomena are here involved and should not be confused. It is not conclusively shown that the action of ultra-violet light is growth promoting in the case of a non-rachitic animal. Nor is it proved that the administration of irradiated foods is growth promoting when administered to a non-rachitic animal.

As regards the apparently beneficial effect of irradiating the air about animals and the cages in which they are kept, it is not easy to do one without the other thing. Both reports should be examined together. It now appears that the beneficial results attributed to irradiating cages with ultra-violet light are to be attributed to the irradiation of sawdust on the floors of the cages. White rats picked up traces of these irradiated substances on their feet, and as they wash their feet with their tongues, the transfer of irradiated substances to their intestinal tract is shown.

* Compare Tisdall, this issue.

A similar explanation serves to show why rats have derived benefit from associating with irradiated animals. It appears to be a contact transfer of vitaminic substances. There seems to be no evidence that vitamin B or vitamin C can be produced by ultra-violet light.

The general tonic effect of ultra-violet irradiation has been often reported. Those who are most inclined to think of it as a cure-all are numbered among those least informed as to the nature and limitations of light. An attitude of open-minded conservatism seems to be in order in scrutinizing all new reports in this field.

Aside from therapeutic results, other biological effects of ultra-violet light have been studied. In our own laboratory the irradiation of solutions of digestive enzymes, both with and without substrate, has confirmed earlier reports in the literature that this type of energy transfer retards enzyme action partially or completely. The same is true of solutions of pepsin exposed to radium emanations, one component of which, the gamma rays, are electromagnetic vibrations.

Other applications of such waves include sterilization of water with short ultra-violet, the possible irradiation of dried milk and other foods, and the varied uses of radium and of roentgen rays in their various fields.

POLARIZED LIGHT

There have appeared in the literature a very few papers, seven in so far as I know, dealing with the effect of polarized light upon biological processes. In ordinary light the wave motion is at right angles to the path of transmission, but in all radii at right angles to this path, so that a cross section of a beam of light is in the order of a circle. In plane polarized light, the vibrations in all except one radius are cut off, giving in effect a flat ribbon of light instead of a circle. Why light in this form should have any special biological effect is difficult to imagine. It is barely possible that there might exist some relation between this uni-directional vibration and the asymmetrical carbon atom structure of protoplasm. Your right hand for instance is a mirror image of your left hand but try as you may you cannot fit your right hand into a left-handed glove or vice versa. The asymmetry of tartaric acid crystals was the basis of some of Pasteur's fundamental researches. By sorting these crystals into two piles, one made on a right-handed pattern and the other formed in a left-handed pattern by the forces which made the crystals, Pasteur showed that a solution of one kind of crystals turned a beam of polarized light to the right while the corresponding solution from the other heap of crystals turned the same beam to the left. Such a vague suggestion of possible relation between polarized light and protoplasm is the best that can be offered after considerable cogitation of the matter. Whatever the inadequacy of theory we have certain reported facts of behavior.

Baly and Semens of Liverpool have reported that the change of starch to sugar by suitable enzymes is accelerated by illumination from polarized light. Our own experiments indicate that such a conclusion may be possible but that more work must be done before an opinion can be definitely formed. Such things as relative light *intensities* must be checked over and eliminated from the equation. It is also suggested in published reports that since moonlight is largely polarized by reflection its effect upon germination of seeds may be more than a superstition.

A timber expert reports that in a certain tract of land in Central America he had a selected number of trees cut into boards during the time of the month when the moon was at its full and the boards were piled alongside a pathway. Fourteen days later when the moon was at its smallest he had an equal number of trees from the same plot cut into boards and piled on the opposite side of the same road. They were left there to observe how long before fungous

growths would rot them. His report is that the pile cut during the period of the month called "the light of the moon" became the site of mold growth much more complete than the other pile cut during the "dark of the moon." He had no explanation to offer.

If the observations of Semens relative to the increased change of starch into sugar in plants when flooded with moonlight be substantiated, is it not probable that the sap of trees be laden more with sugar during the nights of full moonlight than during the nights of little or no moonlight? And if that be so, lumber cut during the succeeding days will have more or less of sugar in it. Every mycologist knows that fungi prefer sugar to starch as food and that starch solutions do not support so luxuriant a growth of cultures as do sugar solutions. The matter of polarized light and starch conversion will stand further examination.

As to reports upon growth of bacteria as affected by moonlight or polarized light, it appears that these reports do not withstand searching examination. The classic report is that fish exposed to moonlight rot faster than fish kept in the dark. The original paper reporting this observation does not show that adequate control of other factors was observed. There are a number of hypothetical reasons other than the presence or absence of moonlight which might have caused that fish to rot, as far as the report shows.

A more recent report from one of our universities relates that a culture of luminescent bacteria was induced to emit light sooner when exposed to polarized light than when grown in the dark. This does not warrant a conclusion that the rate of reproduction or growth of the organisms was affected. If anything was actually influenced it was apparently the biochemistry of the organisms. In some unpublished preliminary work by Stevens and the author extending through the summer of 1925, with more than a score of strains of bacteria grown under carefully controlled and measured conditions of area of illumination, intensity of illumination and temperature, there was no indication of any effect whatsoever in the way of differences in size, rate of reproduction, or the biochemical reactions of any culture when incubated in polarized light or diffuse light of equal intensity. Perhaps all intensities employed were too feeble.

CONCLUSIONS

It is only by carefully controlled experiments in the laboratory that the action of light upon life processes may be explained. Experiments must be controlled as to area of illumination, intensity of illumination, time of exposure, as well as temperature, and the wave lengths of light must be measured and so described that others can repeat the work exactly if definite orderly progress is to be made in this field. Preconceived notions must give way to logical conclusion based upon experimental evidence. When a sufficient volume of accepted observations of an exact nature is available, it will then be possible to set about the formulation of the theory to explain these results. Until such time arrives we shall continue to employ as in the past methods that are largely empirical, methods which have, however, been gratifyingly successful in ameliorating certain ills of mankind particularly of childhood.

HELIOTHERAPY IN SURGICAL TUBERCULOSIS

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IN THE FIELD of surgery, light finds its greatest usefulness in the treatment of tuberculosis, particularly those special forms known as surgical tuberculosis existing in bones and joints. Tuberculosis was the first disease for which light was used as a form of treatment. With the exception of rickets, it has provided us with nearly all of our present knowledge of the value of light as a therapeutic agent. It has been deemed wise, therefore, to devote this paper to a presentation of our knowledge of the use of light in this disease; also to limit the discussion to one form of light, namely sunshine. The information we have obtained from experience with sunlight in the treatment of tuberculosis summarizes practically all of our knowledge in this field, and will serve to indicate how important is its use.

For an adequate conception of the magnitude of the problem we must begin at the beginning with a brief résumé of the nature of the particular form of tuberculosis in which sunshine has proved to be such an effective therapeutic agent. Tuberculosis arises as the result of the invasion of the body by tubercle bacilli. The pathway of invasion is the mouth, to which the organisms are carried on contaminated objects and on dust, but chiefly in droplets coughed out by patients with active pulmonary lesions. From the mouth they may, and most frequently do, pass with the inspired air to the lung. There they are deposited in the alveoli, and set up a primary focus of tuberculosis. Less frequently, they are deposited on the mucous membrance of the nasopharynx, or on the tonsils, where they also set up a primary focus of tuberculosis. Finally they may be swallowed, pass through the stomach to the intestinal tract, and produce primary foci there. While there are thus three main paths of infection—tonsillar, intestinal and pulmonary—it is the pulmonary path which is generally followed. The fate of all such primary foci is similar.

THE COURSE OF A PRIMARY PULMONARY LESION

It will serve our purpose to follow the course of a primary pulmonary lesion, the commonest type. If the number of tubercle bacilli deposited in the lung is small, and if the resistance of the patient is high, the primary tubercle formed by their invasion is quickly overcome by phagocytosis of the tubercle bacilli and repair of the damaged part by fibrosis. This abortive form of tuberculosis limited to the area first invaded, is the form from which the majority of us have suffered, usually entirely unconsciously. After a varying length of time the infection is entirely stamped out, leaving us with a lung more or less scarred, but with a considerable resistance against future exposure to tuberculosis.

In less favorable cases the defensive forces of the patient may fall just short of complete cure. They do succeed in walling up the infection in the area first attacked, but the causative tubercle bacilli lie latent, their fate dependent upon subsequent circumstances. If the patient is placed in good surroundings, and is freed from further infection by tubercle bacilli, he will in time succeed in stamping out his disease. On the other hand, if he is

subjected to bad hygienic surroundings during the period of latent infection, or passes through an exhausting illness, such as influenza, or undertakes a new and fatiguing occupation, the lowering of the resistance which thus results may permit the latent infection to flare up and spread both locally and systemically.

Finally, in a third group of patients, the dose of tubercle bacilli may have been so massive, or the resistance so feeble, that neither cure nor walling off is obtained, and the disease becomes established and spreads.

In the last group (active tuberculosis) organisms in the primary focus sooner or later escape from it and pass by way of the lymphatics to the nearest lymph gland, where they set up a fresh focus of tuberculosis. From this gland, in a similar fashion, the disease spreads to the next gland in the chain, until by a series of such steps the whole of the lymphatic chain draining the area of the primary focus becomes the seat of a tuberculous adenitis—mediastinal adenitis in the case of pulmonary tuberculosis, cervical adenitis in the case of tonsillar infection, and mesenteric adenitis in the case of intestinal invasion.

At any time during this process, the resistance of the patient may become sufficiently great to overcome the disease. On the other hand, the infection, if not overcome, may ultimately result in the invasion of the blood stream by tubercle bacilli, either by way of the lymphatics or by direct erosion of a caseous focus into a vessel. When this occurs, tubercle bacilli in great or small numbers are carried to all parts of the body. Many of them are quickly destroyed by phagocytosis, but others manage to obtain a foothold, and succeed in establishing fresh foci of tuberculosis in parts far distant from the primary focus. In many cases such distant foci are established in bones and joints, their location being determined in part by minor injuries. It is in such a fashion that tuberculosis of bones and joints arises.

SECONDARY LESIONS

The importance of this form of tuberculosis is therefore evident. We are dealing, not with a simple, primary invasion, but with a secondary lesion, which must be accompanied by at least one other lesion from which it arose. These lesions which arise from tubercle bacilli distributed by the blood stream, are usually multiple, and a blood stream loaded with tubercle bacilli will not deposit them in one place, but in many places at the same time. A patient with a tubercular lesion in bone or joint usually has other lesions which have arisen in a similar fashion, and which can be found if they are searched for. Hematogenous lesions are usually multiple, and their seriousness is proportionately increased. We are here dealing with systemic tuberculosis, rather than local tuberculosis.

In the treatment of tuberculosis we unfortunately lack any powerful and rapidly acting therapeutic agent. We have no vaccine to protect us against its onset, as we have for smallpox. We have no antitoxin to neutralize its effects, as we have for diphtheria, and we have no insulin to tide us through the period of illness, as we have for diabetes. We are forced to rely for cure upon the patient's own mechanism of defense.

In bygone years, patients suffering from this disease were regarded as hopeless. They drifted from doctor to doctor, none of whom was able to help them, because in those days the nature of the disease was not understood. Even the existence of the tubercle bacillus was unknown. Their joints were destroyed. Huge abscesses formed, which ultimately perforated the skin. Secondary infection occurred, leading ultimately to the patient's death from amyloid disease. Long years of experience have taught us, however, that we can enhance the patient's resistance, and thus aid him to overcome his infection by certain measures, of which the two most important are rest and sunshine. Of rest, little need be said here. It has been the basis of all treat-

CHILDREN WITH SURGICAL TUBERCULOSIS UNDERGOING HELIOTHERAPY

ment of bone and joint tuberculosis since John Hilton in 1863 first emphasized its importance. In the modified form of pneumothorax, phrenicotomy or thoracoplasty it is used in pulmonary tuberculosis. Its importance and value are great.

SUNSHINE A CURE OF THE ANCIENTS

Of sunshine there is much to be said. Its use goes back to the dawn of history. The same instinct which led ancient people to worship the sun as a god, led them also to a belief in the therapeutic value of sunlight. Sun baths for the cure of disease were recommended by Hippocrates, the father of medicine, by Galen, by Celsus and by Herodotus. The temples of Aesculapias were, in fact, solaria, and it may not be unjust to claim that part of the benefit their votaries obtained was due to the beneficent action of sunshine. However, the blind use to which sunshine was put by the ancients produced no certain effect upon medicine. It was not until the Nineteenth Century that any systematic attempt was made to utilize the sun as a curative agent, and for this credit must be given to the French school of medicine. In 1845 Bonnet of Lyons, in a "Treatise on Diseases of Joints," stated that white swelling of the knee (a disease we now know to be tuberculous) was greatly benefited by exposure to the sun. Bonnet's work was continued by the school of Lyons, by Ollier, and by Poncet, and the advantages of heliotherapy in the treatment of tuberculosis were the subjects of theses by baccalaureates of that university.

The basis of our present knowledge of light as a therapeutic agent dates from Finsen's work published in 1893. His classic treatise upon the action of light upon the diseases of the skin has scarcely been improved upon since his day. Of outstanding importance was his observation that the ultra-violet rays, both visible and invisible, were most active in the cure of the skin lesions, in which he was interested. Since Finsen's time a host of writers have contributed to our knowledge of the action of light. From the surgical point of view the next most important landmark was the establishment, in 1903 at Leysin in Switzerland, of Rollier's Institution for the treatment of surgical tuberculosis by means of sunshine. His work has served as the basis of all modern treatment by this method.

PHYSIOLOGICAL ACTION OF LIGHT

In attempting to discuss the nature of the curative power of sunshine upon tuberculosis, we are faced with difficulties imposed upon us by our ignorance of the exact nature of the physiological action of light. In spite of the vast amount of work which has been done, we are still profoundly ignorant of the exact nature of the complex changes which light produces in the human organism. In the last analysis we are compelled to fall back upon the empirical fact that sunshine *does* cure tuberculosis (as well as other diseases). Our knowledge of this is the result of many years' experience in the treatment of such patients with and without the use of sunshine.

From the surgical point of view, the essential facts of our knowledge of the physiological action of light may be briefly summarized. Most accurately known are its effects upon the skin. Three distinct types of dermal reaction are produced, viz., erythemia, pigmentation and vasodilatation. The erythemia is an early phenomenon occurring within 6 hours of exposure. It is of the nature of an inflammatory reaction, caused by the rays of short wave length. It may be of any degree of severity, from the faintest reddening to the most extensive vesication. Under the name of sunburn it is, of course, familiar to us all. Its degree is dependent upon the intensity of the sunlight, its richness in ultra-violet rays, the duration of the exposure, and the amount of pigment present in the skin. Pigmentation results from repeated exposures to sunlight or to any light rich in ultra-violet rays. It forms the familiar tan one brings home from a summer holiday. It is apparently a protective mechanism, which guards the organism against the powerful active rays. Its intensity varies greatly with the individual. Blonde patients tan slowly and poorly, while brunettes tan rapidly and deeply. Finally, prolonged exposure to sunshine results in a very persistent reddening of the skin due to dilatation of the capillaries. This is best observed in patients who after long exposure to the sun have been withdrawn from that treatment. As the tan fades, the skin is seen to be persistently reddened, and this phenomenon may last for a very long time—up to a year.

Apart from these skin changes, there is little to be said of the physiological action of light in cases of surgical tuberculosis based upon accurate observation. As far as we have been able to ascertain, there is no alteration in the blood chemistry, such as is produced in rickets. The observations of the workers in rickets constitute the most accurate measurements which have been made on the physiology of sunlight.

HOW A CURE IS EFFECTED

How can these somewhat vague effects result in the cure of such a persistent disease as tuberculosis? At one time there existed the feeling that the tubercle bacilli were actually destroyed by the action of sunlight upon them. It is a well known fact that sunlight is a powerful bactericidal agent, killing very rapidly most forms of bacteria which are exposed to its direct action. But most of the tuberculous foci with which we are dealing are deeply situated, and even very thin layers of tissue obstruct the rays of sunlight, particularly the active rays of short wave length. So, except for the occasional superficial lesion of tuberculosis, such as that which occurs in the skin, there is no possibility of tubercle bacilli being killed by the direct action of light. Its curative activity is more complex. In some poorly understood fashion, it alters the metabolism of the patient, and this altered metabolism enables him better to overcome the tuberculous infection. The production of tuberculous antibodies is increased, and the activity of cells which destroy tubercle bacilli is enhanced. In some way this enhanced metabolism is associated with the changes which are produced in the skin. It has been a common observation that the cure of a tuberculous patient

parallels roughly the degree of pigmentation. The greater the pigmentation, the more rapid the cure.

While we are entirely ignorant of the exact nature of such changes, it is fascinating to speculate upon what may be going on. Human beings derive most of their energy from food. Plants derive their energy directly from the sun, and their ability to utilize sun energy is dependent upon the presence of the pigment chlorophyle. The pigment in our skin, melanin, is not so greatly different from chlorophyle, and it may very well be that the presence of this pigment enables us to utilize directly the energy which is in the sun's rays, and to put it to new uses.

There are many parallelisms between the action of sun upon plants and patients. Plants deprived of sunlight grow up pale, weak and spindly; so do children. Plants grown in sunlight become deeply colored, sturdy and strong. The sturdiness and strength of such plant is due to an increase in the skeletal tissues of the plant. A homely illustration of this is the method by which celery is grown for the table. In order to make it white and crisp, it is banked with earth, *i.e.*, deprived of sunlight. If grown without banking it becomes green and tough, *i.e.*, it contains more pigment and more skeletal tissue. In children the same analogy holds. Sunlight makes them brown and prevents or cures rickets, a disease of skeletal tissues. It may well be that this action of sun upon skeletal tissues explains its almost specific effect upon tuberculosis of bones and joints.

HELIOTHERAPY ADMINISTRATION

In actual practice heliotherapy is administered as follows: The patients are first exposed to the sun for short intervals, in order to avoid the danger of sunburn and to build up an adequate degree of tan. There are many ways in which this can be done. The simplest is probably the best. Our practice is to unclothe the patient and expose him for a short period on the first day, usually about 20 minutes. On the second day the exposure is increased to 40 minutes, and on the third day to 60 minutes. Increasing exposures are continued until he is well tanned, and this usually takes 10 days to 2 weeks. The complexion of the patient must be borne in mind. The exposure of brunette patients can be more rapidly increased than can that of blondes. In the latter a tan is more difficult to build up, and is more quickly lost. Since the beneficial action of the sun is produced through its action upon the skin, the greatest effect will be produced by the exposure of the greatest amount of skin. Hence it is important to expose the whole of the patient's body, both front and back. In the heat of summer it is wise to protect their heads from direct exposure to the sun; otherwise headache or other evidences of minor heat stroke may occur.

CONVALESCENT CASES CONTINUING TREATMENT

A straw hat or a sunshade serves effectively for this purpose.

Much has been written on the advantages of sunlight at high altitudes. Rollier, the first and chief exponent of heliotherapy for surgical tuberculosis, insists that the greatest benefit can only be obtained in the high clear atmosphere of mountainous regions. There is probably much truth in this. It is certain, at any rate, that in such situations there is a greater abundance of ultra-violet radiation than at sea level, and it is apparently these rays which are most active in the production of the phenomena which we associate with the cure of the disease; but treatment in such localities is out of the question for many patients. It is of great importance to know that heliotherapy can be carried out with great benefit in any place in which there is a reasonable amount of sunlight. For instance, in Toronto, in an industrial and therefore smoky section of the city, we have applied heliotherapy to our patients, with the greatest benefit on the roof of what was once a factory. The average number of hours of exposure during a summer is 550. Treatment can be commenced in May and continued until October. In exceptional seasons it can be started in March. It is found more important to the community at large to accept the use of heliotherapy in its own locality, even though it may not be quite ideal, than it is to feel that no heliotherapy is of value except that administered on mountain tops.

The results obtained by the use of heliotherapy are eminently satisfactory. As you will understand from the outline of the disease presented here, it is a serious condition. Recovery is prone to be delayed by many serious complications. Yet by means of sunshine, a very high percentage of cures can be obtained. One series of such cases has been our particular interest during the past 6 years. There have been in all 100 cases. Of these 89 are cured and have returned to civil life in occupations in which they are more or less self-sustaining; 11 have either died or are not improved under treatment. There can be no doubt in the minds of those who are associated with these patients that to heliotherapy is to be attributed a large measure of the success which has been obtained.

Valuable as sunlight has proved, there are certain grave limitations to its use. The sun does not shine every day, and in these northern climates there are many winter months in which no extensive heliotherapy can be carried out. The cloudiness of low altitudes and the smokiness of cities also place limitations upon its use. While our results are good, there is reason to believe they would be better could we utilize sunshine more extensively. In an effort to overcome this, artificial lights have been used; lights which give out large quantities of ultra-violet radiation. For the most part these are mercury arcs enclosed in quartz cells. Unfortunately, the results obtained from these are not encouraging. They will produce tanning of the skin, though not to so intense a degree as will sunlight, but their effect upon the disease is much inferior to that of heliotherapy. Our knowledge of the action of sunshine in this disease is too vague to enable us to say wherein the defect lies. It is sufficient to say that in the present state of our knowledge, sunshine, in spite of all its shortcomings resulting from cloudy days and cold weather, is still the best method for the cure of tuberculosis. In addition it has the great merit that it is available to everyone, and costs nothing.

What are the public health lessons to be learned from our experience with heliotherapy in the treatment of surgical tuberculosis? In my opinion there are two, one in relation to tuberculosis, and one in respect to heliotherapy.

SUNLIGHT A POWERFUL STIMULANT TO RESISTANCE

First in regard to tuberculosis: Our experience with sunshine in the treatment of this disease leads us to believe that it

exerts an almost specific curative effect upon it. Recall that the patients we are dealing with are widely infested with the tubercle bacillus; they have it in their lungs as well as in their bones, and usually in many other parts of the body. Recall also the fact that 95 per cent of us at some time during our life pass through a tuberculous infection, and that our successful overthrow of the disease is dependent upon the amount of resistance we can muster against it. Sunlight is a powerful stimulant to the production of this resistance.

If we can cure patients with far advanced and widely disseminated lesions of the disease by means of sunshine, how much easier will it be to cure them if we can supply this powerful agent at the first inception of their infection? Unquestionably, could we protect such patients by means of adequate heliotherapy, their chances of recovery would be very greatly improved. The greatest field of promise in the problem of tuberculosis seems to lie in finding some means which will adequately protect us against these organisms. It is impossible to isolate the community completely from exposures to the disease. It is so insidious in its manifestations and so widespread, that sooner or later we all come into contact with the germs and become infected by them. Our hope lies in enhancing the immunity we already have, and which fortunately is considerable. At the present moment the most active stimulant of this resistance of which we know is sunshine. We should as a matter of course see that our children have an adequate amount of sunshine, just as we see that they have adequate food. We should see that we ourselves have a sufficient amount of its rays.

THE WIDER APPLICATION OF HELIOTHERAPY

Secondly, in respect to the problem of the application of heliotherapy to a wider field than tuberculosis and rickets. Our knowledge of the action of sunshine is greatest in these two diseases. In one we can actually measure by chemical means the effect it produces. In the other we cannot measure its action so accurately, but by following many cases we are convinced that it does produce a beneficial action, even though we cannot follow it in all the devious and obscure channels through which it operates. We are groping blindly, handicapped by our lack of knowledge of the finer physical and chemical processes of the body. But our ignorance of the nature of its action is no reason why we should discard it or limit its application.

Many great benefits to humanity were discovered and have been used purely upon empirical grounds. Witherington discovered digitalis among the dozens of ingredients of a country woman's herbal remedy for dropsy, and digitalis is still our most potent remedy for cardiac failure. Vaccination for smallpox was discovered and proved to be of value long years before we knew anything about the nature of organisms and disease. Indeed, we still are entirely ignorant of the nature of the organism which produces smallpox and of the relationship of cowpox to smallpox which enables it to develop immunity towards the latter. Quinine has been used successfully in the treatment of malaria since the Sixteenth Century, and we still are ignorant of the exact nature of its action.

HELIOTHERAPY ACCEPTED ON EMPIRICAL GROUNDS

We must accept the evidence for the beneficial action of sunshine in the same way. Sunlight is just as necessary for our well-being as it is for that of plants. Indeed the analogy between human beings and plants is not far-fetched. After all we are animal organisms, and our physical bodies are best adapted to an outdoor environment, not to be shut up in houses and offices most of the day. No one who has seen a group of pale, sickly children released from the wards of a city hospital after a winter's confinement, to the sun and open air of a summer home and has

seen them literally blossom forth in good health, with ruddy complexions and plump bodies, can fail to be struck with the resemblance they bear to flowers in a springtime garden.

We have need for sunshine, and we are benefited by it. The facts we have observed so definitely in rickets and tuberculosis are but indices of many other beneficial effects of sunshine. A hundred obscure and elusive evidences of its action upon other diseases and upon normal metabolism await investigation. Let us seize the evidence we have and preach the gospel of the outdoor life and sunshine in every community.

SUNLIGHT AND HEALTH

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A STUDY of the importance of sunlight as a factor in the health of the community until recently has been sadly neglected. This neglect has not been due to any fault of the public health organizations, but rather to a lack of scientific investigation by the medical profession. Although from the time of Hippocrates physicians have observed in a vague manner the importance of light and fresh air in the treatment of disease, until 4 years ago no scientific proof had been noted of a definite effect of light on the metabolism of the body. Since then extensive investigations have been undertaken in this country, in Canada and elsewhere which have yielded results of the greatest importance. It is now not only the duty but the privilege of our public health organizations to disseminate and apply this knowledge in a practical manner for the benefit of the people at large.

Before speaking of the importance of light in the growth, development and general metabolism of the body, we must first consider exactly what we mean by the term "light" or "light rays." Light is still generally regarded as a form of ether-wave energy the character of which is dependent on the length of the wave. Sunlight, or, to use the correct term, solar radiation, is composed of invisible heat rays which have wave lengths longer than 760 millimicrons (a millimicron is one-millionth of a millimeter in length), visible light which varies in length from 760 to 380 millimicrons, and invisible ultra-violet rays which range from 380 to 290 millimicrons in length. Although strictly speaking the term light should be restricted to the visible rays, the term light or sunlight is here used as meaning the total solar radiation.

It was first shown some 50 years ago that sunlight retarded the growth of bacteria. Later it was observed that this action was not due to the heat of sunlight or in other words to the infra-red rays, nor to the visible rays with the exception of some of the shorter ones, but almost entirely to the ultra-violet rays. It was also observed that the shorter the ultra-violet ray the greater was this lethal effect on bacteria. It is obvious on account of this action of sunlight that it is of inestimable value to mankind from the hygienic standpoint. This is one effect of sunlight to which I wish to draw your attention.

Our knowledge of the effect of light on the growth, development and metabolism of the body has been gained largely through the study of one disease, namely, rickets. It is therefore necessary for us to consider this disease in some detail, not only on account of the importance of the

disease itself, but because its reaction to light gives us practically our only biologic test of the efficacy of different light rays. Rickets is a disease of infancy which occurs chiefly during the winter and spring months and in distribution is confined almost entirely to the temperate zones. It involves not only the osseous system but also other parts of the body, particularly the nervous and muscular systems. The earliest manifestations of the disease are restlessness, sweating about the head, the development of soft areas at the back of the skull and enlargement of the junction of the bony and cartilaginous portion of the ribs, the so-called rachitic rosary. Later the muscles lose their tone and the long bones become soft, which results in the development of the well known bow-leg and knock-knee deformities. The blood is characterized by a marked reduction in the concentration of the inorganic phosphorus, and a slight reduction in the concentration of calcium. The most important change produced by rickets, however, and one which is usually overlooked, is a general lack of resistance of the individual to infection. This is by far the most important result of the disease.

Rickets can be cured or prevented by the administration in the food of the so-called antirachitic vitamin which is present in large quantities in raw cod liver oil. The chemical composition of this vitamin is unknown. The beneficial effect can be accurately followed by the appearance of characteristic bone changes readily shown by X-ray examination, and by an increase in the concentration of the inorganic phosphorus of the blood. Rickets can also be cured or prevented by the exposure of the individual to ultra-violet rays.

The effect of ultra-violet rays on rickets was first observed about 7 years ago in Germany. The criterion of cure was the appearance of the characteristic bone changes as shown by the X-ray. No studies were made of the effect of light on the metabolism of the body, however, until 4 years ago when it was shown almost simultaneously at New York, at Johns Hopkins and at Toronto, that ultra-violet rays produce in infants with rickets a marked increase in the inorganic phosphorus content of the blood. It is indeed remarkable in view of the fact that sunlight is the source of energy on this planet that this change in the phosphorus metabolism is the first undisputed effect of sunlight on the human organism which has ever been observed.

THE SHORTEST RAYS THE MOST ESSENTIAL

The shortest ultra-violet rays in the sunlight which reach the surface of the earth are 291 millimicrons in length, all rays shorter than this being absorbed by the layer of ozone in the outer limits of our atmosphere. This means that the ultra-violet rays of sunlight extend from 380 to 291 millimicrons in length. All these rays, however, are not equally effective from the metabolic standpoint. It has been shown, largely by the work of a New York investigator, that the effective rays are of a shorter wave length than 313 millimicrons. Therefore the rays in sunlight which are most essential for the well-being of the human organism range only from 313 to 291 millimicrons in length and constitute less than 1 per cent of the total solar radiation.

There are a number of factors which influence the percentage of essential ultra-violet rays which reach us. One of the properties of these rays is that they possess very little power of penetration and the shorter the wave length the more readily is the ray absorbed. The shorter rays which are the most essential ones, are readily cut off by the smoke dust and moisture in the air. One need only note the amount of smoke which hangs over all our large cities to realize what an important factor this is. Unfortunately no statistics for American cities are available, but in the city of London, England, as compared with the country of England, and as compared with the Swiss Alps, the highest daily percentage of ultra-violet

rays was found to be in the proportion of 6 to 23 to 41. In other words the smoke dust and moisture in the air of London, compared with the Swiss Alps cut off over 85 per cent of the rays which are so essential to mankind. In Toronto we have so realized the importance of this factor that we are building a half-million dollar addition to our Hospital for Sick Children in the form of a convalescent home situated twelve miles outside the city.

The height of the sun in the sky is another factor which influences the percentage of ultra-violet rays which reach us. It is quite obvious that when the sun is low the rays pass through a greater distance of our atmosphere and in this way a larger proportion are removed. We find that the percentage of ultra-violet rays in the early morning or late afternoon sunlight is practically negligible. Also in the winter in the temperate zone the sun is so low that the percentage of ultra-violet rays even at midday is very small. Actual measurements show that in the northern part of the United States and the southern part of Canada only about one-tenth of the ultra-violet radiation is found in the noonday sunlight of January as compared with that of July. The importance of this reduction of ultra-violet radiation may be even greater than the figures indicate as the shortest and therefore the most effective rays are those diminished the most.

GLASS AND CLOTHING IMPENETRABLE

The prevalence of the use of glass in our modern life must be considered in this question of ultra-violet radiation. Ordinary window glass stops all rays shorter than 330 millimicrons in length. Although the light, which has passed through glass, is of the greatest importance from the standpoint of vision and retains all the appearance of ordinary sunlight, it contains none of the potent ultra-violet rays. This fact cannot be too strongly emphasized because so few people realize that light which has passed through ordinary glass has been robbed of practically all the rays which are essential for health.

The last important factor to be considered is the effect of clothes. Ultra-violet rays cannot penetrate ordinary clothing. Even an open mesh removes over 50 per cent of these rays. It is evident that to be effective the ultra-violet rays must fall on the unprotected skin.

We may conclude from all these facts that the effectiveness of solar ultra-violet radiation is dependent on:

1. The clearness of the atmosphere
2. The height of the sun in the sky which is in turn dependent on the time of the day and the season of the year
3. The absence of glass between the individual and the source of sunlight
4. The amount of the body directly exposed to the rays of the sun

THE ANTIRACHITIC VITAMIN

We have stated that rickets can be cured or prevented by two means, first the administration of the antirachitic vitamin and second by the exposure of the individual to ultra-violet rays. At first glance these curative agents appear to have no connection with each other, but recent experiments reported simultaneously from Wisconsin and New York have shown that their action is the result of a common factor. It was found that exposure of different food substances to ultra-violet rays resulted in the production in the food of some substance which possessed the same properties as the antirachitic vitamin. There is no doubt that this substance actually is the antirachitic vitamin itself. It was soon found, however, that in order to produce the vitamin it was necessary for the irradiated substance to contain either cholesterol, an essential constituent of animal cells, or phytosterol, the corresponding plant constituent. In other words, the antirachitic vitamin may be produced by exposure of cholesterol or phytosterol to ultra-violet rays. What chemical change is produced in these substances is unknown. We can make the antirachitic vitamin but we still do not know its composition.

We have to go but one step further to link up the common effect of ultra-violet rays and the antirachitic vitamin. Cholesterol in inert foods can be so changed by exposure to ultra-violet rays that the antirachitic vitamin is actually produced. There is ample proof that cholesterol in the living body is activated in the same manner. Observations have been made that milk from irradiated cows and eggs from irradiated hens contain more antirachitic vitamin than when the animals or birds have not been exposed to ultra-violet rays. Another suggestive fact is that the part of the body exposed to ultra-violet rays, the skin, has a very high cholesterol content. We may conclude therefore that the ultra-violet rays of sunlight produce in the skin the antirachitic vitamin which is carried by the blood throughout the different organs to exert in some manner a vital influence on the metabolism of the body.

CHOLESTEROL IN COD LIVER OIL

The antirachitic vitamin of cod liver oil owes its efficacy to the ultra-violet rays of sunlight. The sea contains a great deal of vegetable matter and as water is comparatively permeable to ultra-violet rays a large quantity of this matter no doubt contains activated phytosterol. Small fish eat this vegetable matter and change the phytosterol into cholesterol. The cod then eat these small fish and store the activated cholesterol in their livers from which it is extracted in the manufacture of cod liver oil.

SUNLIGHT SUPERIOR TO COD LIVER OIL

If the antirachitic vitamin and ultra-violet rays produce the same effect in infants and children are the ultraviolet rays necessary? Can they not be entirely replaced by cod liver oil? I think not. One reason is that the amount of cod liver oil which can be assimilated without the production of a gastrointestinal disturbance is limited. Although immeasurable benefits are obtained by the routine administration of 1 to 2 drams of cod liver oil 3 times a day to infants and children throughout the winter, the beneficial effect of summer sunlight is much greater. It is just possible that if the same amount of the antirachitic vitamin could be given in cod liver oil as is produced in the skin by the ultra-violet rays the effect might be the same. On the other hand, it is not positively known whether ultra-violet radiation does not increase the resistance of the individual regardless of the production of vitamin. It is very difficult to come to a definite conclusion as other factors must also be considered such as the greater amount of fresh air and exercise which children obtain in the summer. Also there is considerable indirect evidence that the visible and infra-red or heat waves of sunlight produce a beneficial effect on the body. In view of these facts it is reasonable to consider that although the antirachitic vitamin can produce the same vital effect on the metabolism of the body as is produced by some of the ultra-violet rays of sunlight; nevertheless sunlight if not absolutely essential for life is of the greatest importance.

Another question which may be legitimately raised is whether we get too much ultra-violet radiation in sunlight. Pigmentation or tanning of the skin which is produced largely by the ultra-violet rays act as a protective measure. In the tropics it is well known that prolonged exposure to sunlight produces deleterious effects but it has been shown that this is the result of the heat rays and not the ultra-violet rays. From the evidence at hand it is extremely doubtful that we can get too much ultra-violet radiation in sunlight.

DISSEMINATING INFORMATION

All mothers should be told of the importance of sunlight as a factor in the production of healthy infants and children. The difference between sunlight and fresh air must be clearly explained as comparatively few mothers will follow instructions unless this is done. They will put their children out each day on the

verandah or in the yard *but carefully protected from the direct sunlight.* We have found that the best results are obtained by telling mothers that they must get their children sunburnt. The objection will be raised that sunlight will hurt the baby's eyes. This is a tradition that has been handed down from generation to generation. In strong light infants close their eyelids which cuts off all the ultra-violet rays and most of the visible and heat rays. In Toronto we have exposed patients daily to sunlight for periods as long as 4 hours and have never observed any ill effects on the eyes.

In the winter it is practically impossible to expose more than just the face of the infant. As ordinary window glass cuts off all the vital rays it is useless to place the patient before a closed window. Certain American, English and German glass works have been experimenting in the manufacture of glass which will transmit these rays. It is expected that this type of glass will soon be on the market at a reasonable price.

Whenever possible even in the middle of winter the infant should be taken out on bright days for a time between the hours of 11 A.M. and 2 P.M. and the sun allowed to shine directly on its face. By April definite sun baths may be given. The infant should be protected from the wind, but the bonnet should be pushed well back to expose as much of the face and forehead as possible. It is advisable to turn the baby slightly on one side so that it may open its eyes without looking directly into the sun. Ten or 15 minutes is quite long enough for the first sun bath as the skin of the infant burns very readily. The duration should be increased about 5 minutes daily until exposure to the direct sunlight lasts 1 hour in the morning and 1 hour in the afternoon. As soon as possible the hands, the arms and legs should be exposed. In the hot summer days the head should be protected from the heat rays and on very hot days it is advisable to give the sun bath between 9 and 10:30 A.M. If these instructions are carefully carried out a surprising degree of tanning will be obtained as early as the first of April. The amount of tanning or sunburn may be taken as a rough estimate of the effectiveness of the treatment.

So far the value of sunlight from the pediatric standpoint only, has been considered, but the beneficial effects are not limited to infants and children. Rickets practically does not occur in adults but there is no doubt that ultra-violet rays are intimately concerned with the vital processes of the adult organism. As has been stated, the great mortality in rachitic infants is due not to the bone changes but to the marked lowering of the resistance to infection. These infants die of bronchopneumonia and other similar conditions and constitute our greatest factor in infant mortality during the winter and spring months. There is no doubt that ultra-violet rays increase the resistance to infection of the adult as well as the infant and child. Experiments undertaken in England in which blood was removed from adults before and after exposure to ultra-violet rays show a marked increase in the bactericidal power of the blood after the individual had been exposed to the rays. The blood platelets, which are now considered to be connected in some way with the resistance of the individual, were also increased in number. These experiments constitute a direct proof that ultra-violet rays can increase the resistance of patients against infection.

There is no doubt that the whole population of our communities suffer from a lack of ultra-violet radiation during the winter months. As a result of this there is an increasing lack of resistance to disease which results in the production during the late winter months of our greatest mortality rate of the year.

It is beyond the scope of this paper to consider other specific effects of ultra-violet radiation as in the treatment of bone tuberculosis or the various skin diseases. The subject of artificial ultra-violet rays from the mercury vapor quartz

lamp has not been considered, as it is very unlikely that these lamps will ever be of general use from the public health standpoint on account of their expense. A discussion of the value of artificial ultraviolet radiation would constitute a separate address. The mercury vapor quartz lamp has not only its advantages but its disadvantages, and it is not out of place to issue here a word of caution against its present-day indiscriminate use in the treatment of almost every known pathological condition. This in time will minimize its real value and bring discredit to the medical profession.

CONCLUSION

Sunlight is essential to life. The rays which apparently are the most essential are the shortest invisible rays. They constitute less than 1 per cent of the total solar radiation. They are readily absorbed by the smoke, dust and moisture of our atmosphere and on this account are markedly diminished in our cities. They are also diminished in the winter and in the early morning and late afternoon, due to the sun being lower in the sky and the rays consequently passing through a greater distance of our atmosphere. They are absolutely cut off by glass and clothes. These rays apparently act on a substance in the skin known as cholesterol and produce what was formerly known as the antirachitic vitamin. This is carried by the blood to the various organs and produces a vital effect on the metabolism of the body. No doubt many changes are produced but the ones we have definitely been able to measure are an increase in the calcium and phosphorus in the blood (the cure of rickets), an increase in the blood platelets, and an increase in the resistance of the individual to infection. If a knowledge of these facts can be disseminated throughout our communities, and applied by the people particularly during the late winter and spring months, it will result in a marked reduction in the incidence of disease and also will be the means of saving thousands of lives.

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STUDIES ON LACTOSE FERMENTING BACTERIA*

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SINCE an interval of 24 hours or more is required to transport water samples to state and central laboratories, the question of providing a proper container is a rather important and often a somewhat annoying problem. No doubt most states must, like Ohio, depend to a large extent upon one central laboratory for the examination of water supplies located in the smaller towns and rural districts. It is probable, therefore, that many state laboratories have had experiences not unlike ours in an attempt to provide a type of shipping box which would accommodate sufficient ice to preserve a low temperature for 24 hours or more, and which would be of such size and construction that it could be used conveniently in the field. We have tried several styles of iced-containers but have found the same objections more or less applicable to all, viz., they do not, especially in warm months, preserve the ice for a sufficient period; they must usually be sent by express, frequently entailing considerable delay; they are rather bulky and heavy, and, therefore, inconvenient to handle in the field; and in addition, they are somewhat expensive, especially if a sufficient supply is kept on hand to meet the demand from all sections of a populous territory.

In view of the foregoing, and upon advice from a neighboring state (West Virginia), that uniced samples had proved satisfactory, we discontinued ice-packing water samples some time ago and adopted our present outfit which consists of a 2-ounce sampling bottle packed in a plain mailing case. It is fully realized, of course, that fresh samples or those which can be chilled and maintained at a fairly low temperature are preferable, but to those who have been engaged in this type of work one need not point out the difficulties which prevent this attainment.

The change to uniced samples, adopted through necessity,† seemed somewhat radical so that the studies herein reported were undertaken to establish some basis of comparison of the iced and uniced samples, and to determine whether the latter would be dependable.

Studies reported by Jordan and Irons,[1] later studies by Jordan,[2] and data obtained on samples shipped to this laboratory during an investigation[3] at Cleveland indicate some of the changes that occur in iced samples. In the latter studies, samples were collected in duplicate, one set being examined at Cleveland while the other set was ice-packed and shipped to Columbus. The character of the samples varied from comparatively unpolluted to grossly polluted water. It was found in some samples that a *B. coli* index of 100 on the fresh samples was reduced to an index of 10 on the ice-packed duplicates. The count on agar at 37° C.

* This paper, covering The Viability of Colon Group Organisms in Water with Special Reference to the Value of the Uniced Samples, is the third and last of a series published in the JOURNAL. See May and June issues.

† The establishment of full-time county health commissioners in Ohio greatly increased the demand for examination of samples from private supplies, and from schools, churches, etc., which had no public water supply available. Also the legal requirement regarding examination of public and quasi-public supplies as frequently as the Division of Sanitary Engineering may direct, caused an increase in samples not only in this laboratory but in others to which samples would necessarily have to be shipped.

ranged from 1,000 to 20,000 per c.c. on the fresh samples while the counts on the ice-packed duplicates, 24 to 48 hours old, were all low, the majority being less than 100 per c.c. Culture media used in the field laboratory and in this laboratory were from the same lots. The decline in the total count on these samples was extreme in some instances, and this was in all probability due to the difference in the initial temperature of the water (about 25° C.) and that obtained by icing. This point was first emphasized by Jordan and Irons,[1] who found that an increase or a decrease in total numbers of bacteria might occur in ice-packed samples depending upon the initial temperature of the water. It is significant, however, that while these investigators report a marked change in the total bacterial content of their samples kept at ordinary temperatures and on ice, the colon bacilli were apparently not greatly affected. To quote from their report, "The influence of ice-packing upon such colon bacilli as may be present in polluted water does not appear to be injurious. We have not been able to observe any marked disappearance of *B. coli*, either in ice-packed waters or in those maintained at a higher temperature, during a period such as might ordinarily elapse during transportation."

Albert, Hinman, and Jordan (G.)[4] in a study of the bacterial changes in uniced water samples attached considerable importance to the total number of bacteria and suggested certain limits for the 20° and 37° C. counts on waters which might be considered safe. The most significant statement in their report, however, is that "gas producers" did not change materially in samples held 72 hours at 20° and 37° C. These investigators concluded that uniced samples could be used for waters that would be regarded as safe by a sanitary survey and chemical analysis.

The principal points considered in the present study are, first, whether colon group bacteria multiply appreciably in water at high temperatures; second, whether they die off much more rapidly in uniced than in the iced samples of waters of different sanitary quality; and third, whether the total bacterial count either at 20° or 37° C. has much significance when determined on either iced or uniced samples and correlated with the sanitary survey of the waters.

TYPES OF SAMPLES AND METHODS OF ANALYSIS

The samples used for comparative tests were collected in duplicate from private well supplies.* One of the 2 samples from each well was immediately packed in ice in a special container which the collector carried throughout each day's collections. The ice was replenished just before shipping. The temperature of these samples when delivered was about 6° to 8° C. The duplicate samples from these wells were packed in mailing cases and forwarded in 1 package by special delivery parcel post to the laboratory. The samples were collected on 4 days, May 28, 29, 31, and June 14. The outdoor day-temperature during this period was about 25° C. and the temperature of the uniced samples was about 24° C. when delivered. The maximum time between collection and examination of the samples was 60 hours, the minimum, 24 hours, and the average, about 36 hours for both the iced and uniced samples. The initial temperature of the water was taken in a few wells of each type and varied from 14° C. in shallow dug types to 10° C. in drilled or driven types. The decrease in temperature in the ice-packed samples was usually less, therefore, than the average increase in temperature in the uniced samples.

Both the iced and uniced samples were examined promptly after delivery to the laboratory and the same procedure was followed on each sample. The presumptive and confirmed tests for the colon group, the total count on agar at 20° and

* The author is indebted to Professor W. P. Miller, Department of Agricultural Engineering, Ohio State University, who collected all samples and made the field sanitary surveys.

TABLE I

COMPARISON OF BACT. COLI RESULTS WITH COUNTS ON AGAR AT 20° AND 37° C., ON ICED AND UNICED WATER SAMPLES, AND A CORRELATION OF THESE RESULTS WITH THE SANITARY SURVEY OF THE WELLS

Iced Samples

No. of Samples	Field Grade	B. coli Results*	37° C. Count** Low (1–50)	Medium (50–100)	High (over 100)	20° C. Count** Low (1–100)	Medium (100–500)	High (over 500)
		Pos. 6	2	3	1	1	2	3
28	Good	Dbt. 7	5	0	2	2	2	3
		Neg. 15	12	2	1	5	3	7
		Pos. 19	7	8	4	4	6	9
29	Fair	Dbt. 7	0	2	5	0	2	5
		Neg. 3	1	2	0	0	0	3
		Pos. 27	6	7	14	4	5	18
30	Poor	Dbt. 2	0	0	2	0	0	2
		Neg. 1	1	0	0	1	0	0

Uniced Samples

No. of Samples	Field Grade	B. coli Results	37° C. Count Low (1–50)	Medium (50–100)	High (over 100)	20° C. Count Low (1–100)	Medium (100–500)	High (over 500)
		Pos. 8	0	1	7	0	0	8
28	Good	Dbt. 2	0	0	2	0	0	2
		Neg. 18	8	3	7	3	7	8
		Pos. 19	3	1	15	1	3	15
28	Fair	Dbt. 0	0	0	0	0	0	0
		Neg. 8	1	1	6	0	3	5
		Pos. 25	0	2	23	0	2	22
29	Poor	Dbt. 0	0	0	0	0	0	0
		Neg. 4	0	1	3	0	1	3

* The terms "Pos.," "Dbt.," and "Neg." refer to colon group positive 1 and 10 c.c., 10 c.c. only, and negative 1 and 10 c.c., respectively, and relate to our general policy of classifying routine samples into the three general groups "Unsatisfactory," "Doubtful," and "Satisfactory" quality on the basis of the laboratory results alone.

** The figures used for classifying the counts are purely arbitrary and were selected for convenience in emphasizing differences in results rather than because of any particular significance in interpreting the sanitary quality of the samples.

37° C., and the differential tests (methyl red and Voges-Proskauer reactions), were all made according to Standard Methods.

The results on the 2 types of samples, both as regards the colon test and counts at 20° and 37° C., are presented in Table I. These results are classified under "Good," "Fair," and "Poor" supplies to show the correlation between sanitary survey and laboratory results. Very little difference was found in the *B. coli* results on the 2 sets of samples. In fact, the difference was not much greater than we have frequently noted in duplicate samples from the same supply when both samples have been kept under the same conditions. Fifty-six wells gave complete agreement in colon results on the iced and uniced samples, while 27 wells gave slight differences. In no instance was there complete disagreement between the iced and uniced sample from the same well, *i.e.*, positive colon test in 1 and 10 c.c. in one sample, and negative 1 and 10 c.c. in the duplicate sample. There was a difference between the iced and uniced samples as regards the count at 37° C. and 20° C., particularly in the latter. This difference was in the direction which would be expected, viz., a higher count at 20° C. on the uniced samples.

TYPES OF COLON GROUP ORGANISMS ISOLATED

The results in Table II show a rather close agreement in the number of cultures of fecal and non-fecal origin as these cultures were classified by the methyl red and Voges-Proskauer reactions. The purpose in making these differential tests was not so much to determine the value of the tests in estimating the sanitary quality of the samples, as it was to detect any appreciable change due to overgrowth or suppression of one or another type originally present in the samples. It has been suggested by several writers that there might be considerable change in the ratio of fecal and non-fecal types in the presumptive tubes, depending upon

the length of incubation. It is apparent that in this series such overgrowth was not a disturbing factor in the relative abundance of the 2 types. The total number of cultures is scarcely large enough to justify conclusions as to the sanitary significance of the 2 types of organisms, but the results are somewhat suggestive, and seem to indicate that there is not enough difference in the incidence of colon and aerogenes in ground waters, classed as "good" or "poor" by sanitary survey, to justify using these differential tests in routine analyses and interpretations. Our results appear to confirm the experience of Winslow and Cohen[5] in this respect.

TABLE II

RELATIVE PERCENTAGES OF "MR+V.P.—" CULTURES ISOLATED FROM ICED AND UNICED WATER SAMPLES

Field Grade of Wells	*Iced Samples*					*Uniced Samples*				
	Total Cultures	MR +	Per cent	V.P. —	Per cent	Total Cultures	MR +	Per cent	V.P. —	Per cent
Good	28	20	71	22	78	25	16	64	14	56
Fair	45	41	91	34	75	31	28	90	25	80
Poor	56	51	91	47	84	44	41	93	39	89

GROWTH AND VIABILITY OF COLON GROUP BACTERIA IN WATER

The comparative data presented have dealt particularly with results on samples of 24 to 60 hours' standing. It seemed important to obtain additional data as to whether colon group bacteria multiply to any extent or whether there is a radical difference in their death rate in naturally infected water kept at different temperatures for considerable time. This point has been investigated by several workers, some of the studies having been made under fairly natural, others under more artificial conditions. Most investigators, with the exception of Savage and Wood,[6] have found that pure cultures of coli do not multiply to any appreciable extent in water, but gradually disappear, the death rate apparently depending largely upon the temperature of storage and the presence of other bacteria.

Hale and Melia[7] found that *B. coli* inoculated into natural water, containing a small number of other bacteria, died rapidly at 37° C. but lived many weeks at 20° C. and 8° C. The death rate curves at the 2 low temperatures were so similar during the first few days' storage that these workers remark, "The charts seem to indicate that samples shipped without ice, unless they should be considerably warmed in transit, may yield good evidence even if a week old." Winslow and Cohen[8] studying the relative viability of coli and aerogenes in tap water stored in glass bottles at 10°–20° C. noted an apparent increase in the former at first, but found that 98–99 per cent of all gas-forming organisms had disappeared by the 10th day. Rector and Daube[9] noted a marked increase in *B. coli* the first day after inoculating unsterilized distilled, tap, and bottled water but a subsequent gradual and regular decrease, until final disappearance of the coli in 48, 29, and 25 days respectively. Levine[10] found that in distilled water inoculated with *B. coli* the death rate increased at higher temperatures. Hinds[11] recorded a very rapid decrease in *B. coli* inoculated into sterile water and kept at 20° C.

Rogers[12] reports that in water artificially infected with feces and held at 20° C., *B. coli* were more abundant than aerogenes at first but the relative numbers were reversed at the end of 9 months so that there were 39 *B. aerogenes* to 1 *B. coli*. This investigator also found that there was a rapid decrease in colon bacteria in sewage held in water, the decrease being more evident in the *B. coli* than in the *B. aerogenes*. These results seem to indicate no marked multiplication of aerogenes but a greater relative abundance due to disappearance of the *B. coli* type. Savage and Wood[6] found in their experiments in which pure cultures of the *B. coli* were added to sterile water that "the *B. coli* strains although in a medium

which contained little or no organic matter, . . . showed in every case multiplication, in most extensive multiplication." However, in their experiments in which excreta or sewage was added to water there was a continuous diminution in the number of *B. coli.*

Clemesha,[13] in extensive studies on the viability of various members of this group, found "no evidence that coli communis multiplies when passed into water in nature" but "that it dies out with considerable rapidity," also that while *B. aerogenes* may multiply at a certain stage of natural purification of water, it does not increase in numbers when stored in water in a bottle. In short, it is apparent from the summary which Clemesha gives of the changes occurring in the bacterial flora of natural waters in the process of self-purification that there is little if any actual multiplication of lactose fermenters; the increase in *B. cloacae* apparently being due more to their resistance and subsequent concentration in water during dry weather, or to their growth in the soil at the bottom of the lake or storage basin. In this connection it is interesting to note that the persistent presence of *B. coli* in a well far removed from recent fecal pollution was attributed by Young and Greenfield[14] to multiplication of these bacilli in the soil around the well, a condition which their subsequent experiments with artificially inoculated soil seemed to confirm.

In addition to the foregoing studies 2 other references have been of interest as indicating the probable effect of temperature upon colon bacilli outside the body. Koser[15] found that fecal *B. coli* inoculated into sterile soil were viable in considerable numbers after 4 months' storage at 18° to 22° C. Jordan[16] found an increase in bacteria, mainly *B. coli,* in the first few days in feces stored at 10°, 20°, and 37° C. This increase occurred at both low and high temperatures. These results would seem to minimize, to some extent, the influence of *temperature* as a factor affecting the viability of colon bacilli, and point to the availability of food supply as a more important factor.

A summary of our results by storing natural well waters containing colon group organisms is given in Table III. These experiments were conducted on fresh samples, and on duplicate samples shipped to the laboratory, either iced or uniced.

It is apparent from these results, first, that there was no appreciable multiplication of members of the colon group in stored samples; second, that there was a gradual and progressive decrease in the number of these organisms when stored in the icebox, and a somewhat more rapid decrease in their number when stored at ordinary temperatures. This decline, however, either in the iced or uniced samples was not so rapid as to seriously interfere with tests made within the usual limits of time required for transporting water samples to the laboratory.

It is usually assumed that water containing a small number of bacteria may soon show a very high count if kept uniced. One would expect this to occur especially with bacteria which develop best at 20° C. Our results in several tests confirm this opinion. This condition does not, however, apply equally well to the 37° C. counts. We found that in most samples there was a rapid increase during storage at ordinary temperatures, but in several instances where the initial count was very low there was no appreciable increase. This may have been due to lack of sufficient organic material to support excessive bacterial life and also to unfavorable temperature in the stored water for certain types of 37° C. organisms, so that there was an actual reduction in their number after a few days' storage at room temperature.

SUMMARY

The number of colon group bacteria in samples of ground water did not change materially in the first 48 hours after collection regardless of whether the samples were kept at ordinary tempera-

TABLE III

Exper. No.	*Icebox Storage* Days Storage	No. of Samp.	B. coli 1 c.c.	B. coli 10 c.c.	*Room Temp. Storage* Days Storage	No. of Samp.	B. coli 1 c.c.	B. coli 10 c.c.	
I	None	16	+	+	None	18	+	+	5 samples negative 1 and 10 c.c. were still negative 1 and 10 c.c. at end of 9 and 13 days' storage at ice box and room temp.
	9 days	5	+	+	9 days	1	+	+	
		5	—	+		5	—	+	
		6	—	—		12	—	—	
	13 days	5	—	+	13 days	2	—	+	
		11	—	—		16	—	—	
IIA	None	12	+	+	None	12	+	+	6 samples negative 1 and 10 c.c. were negative 1 and 10 c.c. at 1 and 4 days' storage in ice box.
	1 day	11	+	+	1 day	10	+	+	
		1	—	+		1	—	+	
						1	—	—	
	4 days	5	+	+	4 days	2	+	+	
		5	—	+		6	—	+	
		2	—	—		4	—	—	
IIB	None	8	—	+	None	4	—	+	7 samples negative 1 and 10 c.c. were negative 1 and 10 c.c. at 1 and 4 days' storage at room temp.
	1 day	1	+	+*	1 day	1	+	+	
		2	—	+		3	—	—	
		3	—	—					
		2	+	—**					
	4 days	1	+	+*	4 days	1	—	+	
		2	—	+		3	—	—	
		5	—	—					
			.1 c.c.	1 c.c. 10 c.c.			.1 c.c.	1 c.c. 10 c.c.	
III	None	7	+	+ +	None	4	+	+ +	7 samples negative 1 and 10 c.c. were negative 1 and 10 c.c. at end of 10 days' storage at room temp. and in ice box.
	10 days	2	+	+ +	10 days	1	+	+ +	
		5	—	+ +		2	—	+ +	
						1	—	— +	
	None	4	—	+ +	None	4	—	+ +	
	10 days	3	—	+ +	10 days	3	—	+ +	
		1	—	— +		1	—	— +	
	None	6	—	— +	None	8	—	— +	
	10 days	2	—	— +	10 days	1	—	+ +***	
		4	—	— —		7	—	— —	

* The uniced duplicate of this sample was pos. 1 and 10 c.c. on original and 1 day storage test.
** Both these presumptive tests gave negative Endo plates.
*** The iced duplicate of this sample was pos. 1 and 10 c.c. on original and 10 day storage test.

tures or packed in ice. Samples shipped without ice-packing will, therefore, yield dependable results and may be safely utilized where ice-packing is impractical.

The change in the total bacterial content was more marked at ordinary than at icebox temperatures and it would be unwise to attach much, if any, importance to counts on uniced samples. In fact, there was so little correlation between 37° C. counts and the *B. coli* results on shipped samples that very little significance should be attached to 37° C. counts even on iced samples.

Colon-group organisms in natural ground waters stored in the laboratory at icebox and ordinary temperatures showed no increase in number but showed a gradual decline which resulted in a disappearance of these bacteria in about 2 weeks.

A type of container which permits sending water samples uniced by mail has been found to be much more convenient and practical than a shipping case providing for ice-packing, and the use of the uniced containers seems justified by the results obtained in these studies.*

* Leo F. Ey and Mrs. Rosemary Bole assisted in these studies and grateful acknowledgment is made to them.

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NEED OF EPIDEMIOLOGICAL RESEARCH IN TRACHOMA*

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Medical Director National Committee for the Prevention of Blindness

ANYONE REVIEWING the literature of trachoma, very soon notes considerable agreement regarding the pathology of this eye scourge. This is particularly true when the involvement has advanced to a stage where there is no longer any question as to clinical diagnosis. Trachoma progresses slowly, by successive stages, over a period of years. Spontaneous cures may result. Without proper care, destructive action and cicatrices may require prolonged surgical treatment or cosmetic operative procedure. In all advanced stages, severe suffering ensues, and serious visual impairment or blindness results.

It is interesting to note the great uniformity of statements in the literature that trachoma is contagious. This is especially noticeable during the period from the time of Hippocrates until about the beginning of this century. One is reminded of the statements so constantly copied in medical systems and compendiums with reference to other diseases—these copied statements that clutter up the literature without adding much of value.

It is rather curious to note that few among the many who have written about trachoma should have associated any possible causative factors other than contagion, insanitary conditions and poverty. Even those who have studied trachoma in its world-wide aspects seem to have considered these things for the most part, and to have given great weight to these things only.

Within very recent times, however, the question has been raised that the disease may not be highly contagious or readily transmissible and that it may not be due to a specific virus. There are some even who raise the question: "May trachoma be primarily a deficiency disease?" This question is likely to arise in the minds of all public health authorities dealing with trachoma.

Considered geographically, trachoma is not a public health problem, except with people seasonally or habitually underfed and usually living under insanitary conditions. Egypt and Algeria, Palestine, China, the Balkan States, the Appalachian and Ozark Mountains, and the dwelling places of our Indian wards all strikingly suggest food deficiency. With these peoples we have well known seasonal or habitual dietary faults inimical to the maintenance of health, but we also have innumerable opportunities for irritation of eye tissues both from a variety of recurring infection and from dirt or other foreign bodies.

In 1897, the U. S. Public Health and Marine Hospital Service declared trachoma "a dangerous, contagious disease." Subsequently, nearly every state adopted regulations making this dangerous, contagious disease reportable or even quarantinable. Exclusion of those immigrants having trachoma was wise and has undoubtedly saved the country considerable dependency.

Until now the advantages for the afflicted in this country have come almost wholly through curative medicine, although at times under the administrative

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guise of public health and preventive medicine. The compelling appeal for salvage treatment and relief from suffering of the many citizens afflicted in certain areas amply justifies an appeal for large expenditure for some years to come. As health workers we should encourage pouring out of funds for this relief work and, if need be, sponsor it; but at the same time we should not offer hope of complete extermination of trachoma until epidemiological studies have revealed the essential faults permitting it to develop.

Rational eradicative measures must follow scientific determination of the epidemiology of trachoma and in all probability will have to be carried out for the most part in the home by educational measures.

In reviewing the literature for evidence of contagiousness and transmissibility, a curious state of flux is found. First, great confusion exists in all the older literature because such a large amount of it includes infectious diseases of the eye readily recognizable by modern laboratory methods. No differentiation occurs. It is impossible to satisfactorily review the evidence of contagiousness as published because of the possibility of any one of half a dozen forms of bacteria being carried over in what was alleged to be evidence of the contagiousness of trachoma. The literature of contagiousness may not be satisfactorily evaluated also because the clinical descriptions of the disease acquired in the alleged transfer of contagion is so incomplete that the conservative ophthalmologist will not agree to the final diagnosis given by the writer.

For exactly similar reasons the announced accidental or deliberate transmission experiments as published are of little value to the reviewing epidemiologist or thoughtful ophthalmologist. They nearly all include the possibility of transmitting many different infections commonly found in the trachomatous eye. The treatment in some reported accidental conditions seemed more dangerous than trachoma itself.

Statements are often made and published in the literature of trachoma that are mere impressions, not supported by detailed evidence; hence may not be evaluated by others and are of little value.

Etiological studies have been almost barren, although announcements that the causative agent has been discovered are rather frequently found. The trouble is too many causes have been proved.

FINDINGS IN TRACHOMA

About 10 announcements of definite causative factors may be found in the literature, 3 or 4 reporters announcing definite production of the disease. These findings were discredited later.

In 1881, Sattler announced a micrococcus as the causative agent, and Koch, while in Egypt, in 1883, doing research work in the wake of cholera, seemed for a time to confirm this finding, as did also von Michel. Later, in 1885, von Michel himself described a micrococcus differing from Sattler's organism with which he was able to produce trachoma. In 1890, Noiszewski described the microsporon trachomatosa, while during the next year 2 different bacilli were described as being responsible for trachoma, one by Hirschberg and Krause, the other a little organism from 1 to 2 microns long and from three-tenths to one-half microns broad, found by Shongolowicz.

About 1897, research workers again became active in announcements, Mueller finding a bacillus which was believed for a time to be the influenza bacillus but later was generally accepted as the Koch-Weeks, while Burchardt, in 1897, announced a coccidium as the suspected factor. Czaplewski in the same year described ameboid bodies in the trachoma follicles and cell tissues; while Elze gave a similar description of plasmodia classed among the monads; and the following year, 1898, Katharin Kasalsky described a hyalin body as a probable causative factor.

Following this activity came a period of years when reporters veered toward

scrofula as the underlying fault. The best descriptions perhaps were presented by Baeck, Hummelscheim, and Hourmouziades.

The next fertile period for announcements came with the Halberstadter and Prowaczek studies in 1907, to be followed in 1910 by Lindner, the former describing an inclusion body, the latter an initial body. Most of us accepted the former, and a good many for a time accepted the latter also as being directly concerned in the production of trachoma. This teaching stood until the widespread finding of both these bodies in every epithelial tissue invaded by the gonococcus. One gathers from this literature that at present insufficient evidence is available to accept any of these announced factors as of considerable significance, even though Lindner continues feeling that the gonococcus perhaps in some altered form is the causative factor.

It is safe to say, however, that health officials have overvalued declarations that trachoma is a dangerous, infectious disease. With the great bulk of the literature of trachoma in such an unsatisfactory state and almost impossible to evaluate, one would perhaps be sustained in saying that the statistics of prevalence of this disease, at least in the earlier literature, need to be discounted anywhere from 50 to 80 or 90 per cent, and in the early days of American discussion and diagnosis perhaps discounted anywhere from 25 to 50 per cent. The large number of diagnoses of trachoma (130,000) reported about 1904 in the public schools of a large eastern city, in the judgment of many of that city's ophthalmologists, are grossly in error and illustrate the points just made. The same city reports 71 to-day.

Undoubtedly, the best diagnoses of trachoma are now made at the larger ports of entry, where U. S. Public Health Service men with years of training and opportunities for keeping under observation many doubtful cases often for a period of weeks become skilled in this diagnostic work. A few ophthalmologists in some sections of America have had sufficient experience with trachoma to give dependable judgment in diagnosis and treatment.

A review of the literature fails to find any complete epidemiological study. Some reports alleged to be epidemiological studies are mere surveys of prevalence and reviews of laboratory researches aiming to determine etiology. No extended study of environmental faults seems to have been recorded. It is incumbent, therefore, upon health officers to consider trachoma from a public health viewpoint, rather than from a clinical viewpoint, and to feature what needs to be cleared up in order to give rational public health treatment to this great scourge.

In view of the findings of research chemists who have proved the relationship between certain diseases and essential foodstuff, it now behooves us as public health workers to consider this newer literature in relation to many diseases. In view of the relationship of trachoma to peoples of known seasonal or habitual food shortages, it is apparently highly desirable not only to correlate food data with the usual epidemiological data, but to do so in a very thorough fashion. McCollum and his coworkers, Osborn and Mendel, Sherman, Mellenby, Yudkin and Lambert, Walbach and Howe, and many others readily produce xerophthalmia by manipulation of foodstuff given experimental animals. Blegvad, Bloch and Mori report several thousand cases of xerophthalmia in Denmark and Japan in human beings, for the most part in young children, under conditions almost analogous to experiment.

Wason shows epithelial change and infiltration of cells in the eye tissues by withholding fat-soluble A. Yudkin and Lambert with great regularity note a pathological condition beginning in the upper lid epithelial tissues prior to bulbar involvement under similar feeding experiments. Walbach and Howe confirm Wason's observations and point out simi-

lar change with keratinization in secretory epithelium elsewhere. By these feeding experiments, then, a lid pathology may be produced strikingly resembling certain early pathological stages described in trachoma. Could the other stages be produced by irritation?

Stucky has raised the question of trachoma being primarily a deficiency disease, and conversely has reported striking curative results from utilizing foodstuff known to be rich in vitamin A as an adjunct to local treatment and in preventing relapses.

It would seem to be as logical to at least think of the primary fault in trachoma being dietetic or metabolic as to think of the fault being dietetic in beriberi, scurvy, rickets, phlyctenular conjunctivitis, pellagra, nyctalopia, or iodine shortage in goiter. It would be well, then, that studies to determine epidemiology and etiology should heed the findings of research chemists in determining conditions favoring the development of deficiency diseases.

EXTENSIVE RESEARCHES NEEDED

Field researches are needed, and should include the usual data plus exact details of food habits in afflicted families both among the trachomatous and in those escaping the disease, and for several years prior to as well as coincident with first eye involvement.

It would also be advisable for state authorities and provincial authorities to stimulate laboratories equipped for research work along this line to undertake rational feeding experiments.

Experimental feeding researches are needed somewhat comparable to those made in producing xerophthalmia in animals. Perhaps it would be well to stop short of serious corneal involvement—say at the point where we, from experience, anticipate lowered resistance of lid tissues—and then, instead of carrying tissue change further by still withholding essential elements of food to try and retain the physical condition reached, and begin regular systematic irritation of lid membranes with sterile agents, continuing the irritation over long periods of time, and concentrating the irritation on the upper lid lining. By such a method it might be determined if a pathology comparable to trachoma could be developed. Control experiments might well be run by inoculating the eyes of similarly fed animals with known bacteria, while controls without irritation would serve as check against error.

An epidemiological research such as would seem to be indicated would be costly and is likely to require a period of years for consummation. Perhaps it may not be done within the available funds allotted state health departments or provincial health departments for research. The U. S. Public Health Service has begun, and the Canadian Public Health Service and the other governmental health agencies of the world should enlist. The great Foundations may here find a useful field for research.

Trachoma is a great international scourge, and is perhaps the greatest single cause of vision impairment and blindness. This wasteful scourge remains a health challenge and an economic challenge to international health effort and to the agencies promoting administrative health work.

DETERMINING CARRIERS OF B. DIPHTHERIAE*

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THIS STUDY of cultures from a group of individuals of approximately the same age but from various localities was undertaken in an endeavor to collect statistics on the number of carriers of *B. diphtheriae*, which might be present in such a group, and to correlate the distribution of such carriers with the localities where diphtheria had been endemic.

In the routine physical examination of persons entering the university, the nose and the throat are examined in order that an exact record of the physical condition of each entrant may be obtained. The physical examinations are made early in the first week of university exercises so that it is scarcely to be expected that a student may have picked up organisms of diphtheria from other students, *i.e.*, the nasal and pharyngeal flora would be typical of pre-university associations.

Nose and throat swabs were taken in the usual way. A sterile swab was applied to the tonsillar region on each side and swept over the pharynx. A second sterile swab was inserted first into one nostril and then into the other. A numerical record was kept of each set of swabs, cards with duplicate numbers being filled out by the entrant, giving his name, college address, and home address. In the late afternoon the swabs, collected during each day, were rubbed over the surface of Loeffler's blood serum slants, the nose and the throat swabs from each individual being rubbed over the same slant. The tubes were incubated for 18 hours at 37° C. At the end of this time a smear, made from the growth on each slant was stained with acetic toluidin blue and examined microscopically. Eighty per cent of the smears were examined by 2 persons. A positive morphological diagnosis was made on the basis of the occurrence of types A, C, and D of Wesbrook's classification.

PROCEDURE OF EXPERIMENT

The total number of cultures taken from the entering students was 514. Of this number 18 were found to contain morphologically typical *B. diphtheriae*. The virulence of these organisms was tested by the intracutaneous method recommended by Force and Beattie.[1] The reliability of this test has been corroborated by Havens and Powell,[2] by Bull and McKee,[3] and by FitzGerald and Doyle.[4] The entire growth on a slant was washed off with 1 c.c. of sterile physiological salt solution. After a uniform emulsion had been obtained, 0.2 c.c. of the suspension was injected intracutaneously into the shaven side of a white guinea pig. A small epidermal wheal was produced. A corresponding amount was injected into the shaven side of a control guinea pig, which had received 500 units of diphtheria antitoxin one-half hour previously. White guinea pigs were used because the pigmented skin of a colored guinea pig may interfere with the interpretation of the reaction. Six such intracutaneous injections were placed on each animal.

The animals were inspected at the end of 24 and 48 hours. On the normal guinea pig, suspensions containing virulent organisms produced redness and

* Report of an experiment carried on in the Department of Hygiene and the Department of Bacteriology and Experimental Pathology, University of California, Berkeley, Calif.

induration at the end of 24 hours. This was followed by necrosis which was characterized by a white circular area with an extending purple center. There was slight sloughing of the epidermis and crust formation. The site of injection on the control pig showed redness and slight induration at the end of 24 hours but this had almost disappeared at the end of 48 hours. Of the 18 morphologically positive cultures tested by this method, only 2 developed enough toxin to produce the characteristic "target" lesion indicative of virulence.

During the second week following the examination of the entrants, it was possible to take cultures from 128 women students who desired to pass the eligibility tests for women's sports. Nose and throat cultures were made from each person. The process of taking the cultures and the subsequent procedure were the same as described above. Only 1 smear showed morphologically positive *B. diphtheriae*. The intracutaneous virulence test was negative. Thus out of a total of 642 cultures, 19 (2.9 per cent) were found to contain morphologically positive *B. diphtheriae*. Of this number 2 were virulent (0.3 per cent). Of the 19 persons carrying morphologically positive organisms 2 (10.5 per cent) carried virulent bacilli and 17 (89.5 per cent) carried non-virulent bacilli.

TABLE I*

Observers	Morphologically positive	Virulent	Non-virulent
Von Sholley, 1907	56	18	38
Moss, Guthrie, Gilien, 1912	33	6	27
Goldberger, Williams, Hachtel, 1915	19	2	17
Perkins, Miller, Ruh, 1916	18	0	18
Guthrie, Gilien, Moss, 1920	99	11	88
Wadsworth, 1920	53	18	35
Wade and Vaughan, 1920	128	6	27
Wade and Vaughan, 1920	417	6	411
Bull and McKee, 1923	198	26	162
Totals	1,021	103 (11.1%)	1,011 (88.9%)

* From Kelly and Potter.

These results agree in general with those obtained by many investigators of non-contact groups. In a series listed by Kelly and Potter,[11] 11.1 per cent of persons showing morphologically positive cultures carried virulent organisms and 88.9 per cent carried non-virulent organisms (Table I). A second series published by Nuttall and Graham-Smith[12] has been extended by the addition of the results of later observers (Table II). There were 34,756 individuals in these various non-contact groups. Of these 620 (1.8 per cent) carried non-virulent diphtheria

TABLE II

Observers	Number of unexposed persons examined	Persons carrying virulent diphtheria bacilli	Persons carrying non-virulent diphtheria bacilli
Park and Beebe, 1895*	274	2	23
Kober, 1899*	588	0	3
Denny, 1900*	235	0	1
Cobbett, 1901*	43	0	0
Cobbett (unpublished)*	90	0	0
Pugh, 1902*	415	0	17
Graham-Smith, 1903*	362	0	1
Pennington, 1907*	125	2	11
Williams,[13] 1902	140	10	44
Von Sholley,[14] 1907	1,000	18	38
Goldberger, Williams, Hachtel,[15] 1915	4,093	2	36
Blanton and Burhans,[16] 1919	8,236	3	21
Guthrie, Gelien and Moss,[17] 1920	800	11	88
Beckler, Gillette and Parker,[18] 1921	8,389	36	2
Stovall and Scheid,[19] 1922	1,096	1	5
Bull and Havens,[20] 1923	7,790	136	273
McGuire and Hitchens,[11] 1923	1,080	9	57
Totals	34,756	230	620
Per cent		(.66)	(1.8)

* Taken from the table in Nuttall-Graham-Smith.[12]

bacilli and 230 (0.66 per cent) carried virulent diphtheria bacilli. Of the 850 persons showing morphologically positive cultures 27 per cent carried virulent organisms and 73 per cent carried non-virulent organisms.

HISTORY OF TWO CARRIERS

There are some points of interest in the subsequent history of the 2 carriers of virulent organisms, L.F. and M.A. During the week following the survey, these 2 persons were requested to report to the laboratory for further tests. Through some misunderstanding, L.F. reported to the university infirmary and the swabbings taken from him were sent to the State Hygienic Laboratory which returned a negative report on the basis of morphology. In response to a second request, he returned 6 weeks later when swabbings were taken from the nose and

throat. Blood was also collected for a Kellogg test.[5] The cultures were negative morphologically and the Kellogg test showed that the subject's blood contained less than 1/30 unit of antitoxin per c.c.

On inquiry as to possible history of, or contact with, diphtheria, L.F. gave the following information: He resided with his parents in San Francisco. He never had diphtheria, nor had any of his family or associates had diphtheria. However, on further inquiry, it was learned that he had suffered from a sore throat and general malaise for 4 or 5 days before entering the university. This history suggests the possibility that he might have been suffering from a very mild attack of diphtheria and might be classed as a "missed" case.

Weaver[6] has reported the examination of 11 carriers of virulent organisms, discovered in the routine examination of the Chicago Board of Health. Most of these carriers gave a history of sore throat several days previously. These cases cleared up almost immediately. The failure to demonstrate antitoxic immunity in L.F. may be explained by the presence of an antibacterial immunity, as suggested by Park.[7]

The culture taken from M.A. was found to contain typical diphtheria organisms with bipolar granules. The first intracutaneous virulence test was obscured by the formation of a pustule at the site of inoculation on the normal guinea pig and of a similar one on the control. During the following week, 2 sets of nose and throat swabbings were made from M.A. One set was planted by Miss Dorothy Doyle, who tested the resulting field culture for agglutinability with a polyvalent antidiphtheritic serum, according to the technic described by FitzGerald and Doyle.[4] Agglutination took place in a dilution of 1:640 of this serum. A pure culture isolated by her from the field culture was also agglutinated by a 1:640 dilution of this serum. An intracutaneous test made with the pure culture showed that the organism was virulent. The nose and throat swabs of the other set were rubbed separately on slants of Loeffler's serum medium. After incubating 16 hours at 37° C. a microscopic examination was made. The examination showed rod forms of typical morphology in both the nose and the throat cultures. Intracutaneous virulence tests were made with both cultures. A positive reaction was obtained with the nose culture but the reaction produced by the throat culture was again obscured by the presence of a pustule.

During the next week another set of cultures was taken. The microscopical examination was positive and the intracutaneous virulence test with this field culture was positive. A Schick test made at this time showed a typical positive reaction. This result in a carrier with no history of recent diphtheria is in accordance with the observations of McGuire and Hitchens,[8] who report the finding of 3 carriers of virulent organisms who gave positive Schick reactions, but who make no attempt to account for such findings. In order to check the Schick reaction, M.A. was bled from the arm vein, and 0.4 c.c. serum was sent to the State Hygienic Laboratory for a Kellogg test,[5] the result of which confirmed the Schick test. It is possible that the immunity of this subject is antibacterial rather than antitoxic, as suggested by Park.[7] Serum from M.A. was given to Miss Doyle who tested it for agglutinative powers. The serum agglutinated the organism, which had been previously isolated in pure culture from M.A. and also agglutinated a stock culture of serological Group II of *B. diphtheriae* which was virulent.[9, 10]

On inquiry into a possible history of or contact with diphtheria, M.A. gave the following information: A younger sister had diphtheria 6 years previously. M.A. was given antitoxin as a protective measure and remained free from any clinical evidence of diphtheria. There had been no other case of diphtheria in the family. One year ago diphtheria appeared in the dormitory in which she was living at the

University of North Dakota. The dormitory was quarantined and cultures were taken of all inmates. M.A. gave a negative culture and showed no clinical manifestations of diphtheria. She is at present in good health. Dr. Shutes of the university infirmary made a careful examination of her nose and throat. Tonsillectomy had left the tonsillar fossae clean and smooth. The posterior wall was also clean. There was slight enlargement of the lateral lymphoid tissue. The septum of the nose was straight and there was good ventilation throughout.

CONCLUSIONS

This survey of entering students shows that 19 (2.9 per cent) of 642 persons examined harbored morphologically typical *B. diphtheriae* and that 2 (11 per cent) of this 19 carried virulent organisms. The virulent carrier rate for the whole group is 0.3 per cent.

Because of the small number of virulent carriers, it is impossible to correlate their geographical distribution with localities which are endemic foci of diphtheria.

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* Deceased.

EDITORIAL SECTION

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PREVENTION FIRST, LAST AND ALL THE TIME

THE FAMOUS saying of Pasteur, "It is within the power of man to banish contagious disease from the earth," seems to be in need of emphasis. At the recent and first American Health Congress a well known practitioner and professor advised against prevention of common and so-called children diseases on the ground that it would lead to later and more severe epidemics.

This pernicious doctrine has long been current among the laity. It is one of those half truths which are more dangerous than distinct errors. Let us take measles, for example. The history of measles in our southern camps with the dreadful mortality from broncho-pneumonia is still fresh in our minds, and one cannot doubt that this mortality would have been lessened had these boys been exposed to measles as children, as is usually the case in cities. On the other hand we must remember that measles causes approximately 10,000 deaths per year in the United States—a conservative estimate—coming second to diphtheria among the acute contagious diseases. The ill-considered advice given in this address is that precautions should not be taken against measles, but rather that its spread be fostered. In other words, let these 10,000 children die each year without any attempt at prevention!

It is perfectly true that there are certain diseases in regard to which we seem to be helpless, measles and influenza being typical examples, but this should stimulate us to increased endeavor rather than otherwise. If we should apply a similar doctrine to all contagious diseases, we would discontinue vaccination against smallpox, typhoid fever, diphtheria, and the other diseases for which we have developed efficient preventive measures, as well as some now under trial. The result would be to discard all preventive medicine, as far as contagious diseases go. We would be obliged to devote our attention entirely to the building up of the body and the preservation of health from the physical standpoint, yet it is well known that seemingly perfect health does not protect against many of the contagious diseases.

When we remember the almost marvelous success we have had in dealing with yellow fever, typhoid fever, smallpox and other diseases, we can never bring ourselves to accept the idea that even one disease should be allowed to go without efforts at prevention. Such a doctrine would be deadening. Not a year passes without some discovery which increases our control over contagious diseases. There is no more reason for allowing even chickenpox to rage freely than there is for

allowing smallpox to do the same thing. The fact that one is a comparatively harmless disease, as far as life goes, while the other has a high death rate, enables us to enforce measures against one which the public would not stand for in the other, but from the scientific standpoint there is no difference between the two cases. People will not be good unless they are frightened. Preventive medicine must be taught largely through fear of death, but this is because we are not yet sufficiently educated and civilized. Certainly the medical profession must be the one to stand for high ideals. Whatever difficulties there are in the way of enforcing prevention must be removed by the slow process of education. We have enough to contend with in the various cults and pseudo-religious bodies. The medical profession should not prostitute itself by giving aid or encouragement to any such pernicious doctrine.

PASTEURIZATION OF MILK

THERE ARE few more important public health matters before us to-day than the pasteurization of milk. For a number of years we have been more or less at peace with the commercial interests, after having adopted generally a temperature of 145° F. maintained for 30 minutes, though certain people have been bent on lowering the required temperature, chiefly on the ground that the cream line was injured by this heat. In August, 1925, the Public Health Service issued *Bulletin 147*, in which it was claimed on the basis of experiments made possible by the Borden Farm Products Company that a minimum temperature of 142° F. for 30 minutes provided an adequate margin of safety over the thermal death point of the tubercle bacillus, which was stated to be 138° F. This led us to publish an editorial,* entitled "What Is Pasteurization?" in which a short review of some of the history of pasteurization was given. It ended by advising public health officials to await the report of the Committee on Milk Supply of our Association before changing their milk regulations. In the same issue a review of the bulletin was given showing that the conclusions drawn were not justified by the experiments as given.

The errors in *Bulletin 147* were pointed out to the Surgeon General of the Public Health Service, who acknowledged some of them quite freely, but after a long correspondence in which many facts were laid before him and the offer of material disproving some of the claims put forward was made, the determination was reached by him not to make any correction of the errors put out by the Service in *Bulletin 147*. Many people regarded this as a blow at public health and *Bulletin 147* was used in certain attempts to lower the standards of pasteurization, all of which, as far as we are aware, fortunately failed.

It is with great pleasure, therefore, that we are able to announce that the Conference of State and Provincial Health Authorities of North America with the Public Health Service, in Washington on May 24–25, unanimously adopted as a standard for pasteurization a temperature of 145° F. maintained for 30 minutes.

We repeat our warning that the standards for pasteurization should not be lowered except on very much better and more accurate evidence than any brought forward so far, and not until more efficient apparatus is generally available and official supervision more thoroughly carried out.

The Conference is to be congratulated on its stand for the public welfare.

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* *A. J. P. H.*, 15, 8:711 (Aug.), 1925. See also page 768 this issue.

THE EPIDEMIOLOGY OF DENGUE

OUR KNOWLEDGE of the etiology and epidemiology of dengue has finally been greatly cleared through the excellent work of the Medical Department Research Board of the U. S. Army, consisting of Lieutenant Colonel J. F. Siler, Major Milton W. Hall, and Major A. Parker Hitchens, to whom we extend our hearty congratulations.

It is true that for a number of years past, owing to the work, first of Graham and later of Ashburn and Craig, we have had no doubt that dengue was transmitted by a mosquito; the Culex have been chiefly incriminated.

The work of the Research Board has definitely excluded the Culex as a carrier of dengue, and with equal conclusiveness has shown that the Aëdes aegypti, commonly called the Stegomyia faciata, has been shown to be the spreader of the disease. The close similarity existing between yellow fever and dengue, from the epidemiological standpoint, has been further demonstrated. Two striking differences between the two diseases, one practical and one scientific, are brought out. Dengue is a disease with almost no mortality while yellow fever is highly fatal. It is, therefore, more easy to insist upon measures for control of yellow fever than for dengue, and more easy to obtain money for mosquito control in one case than in the other. The second great point of difference is the comparatively transient character of immunity produced by one attack of dengue. In all other respects, the parallelism between the two diseases is most striking, and both probably originated in tropical America.

The blood in cases of dengue is infective to the mosquito for a few hours before the appearance of symptoms and during the first three days of the disease, but it is not until the eleventh day that the mosquito which has fed on infected blood becomes able to transmit the disease to a susceptible person. During the ten days between biting and the development of infectivity, it is evident that the causative organism multiplies or passes through some developmental stages in the body of the mosquito, after which it remains infective for a long time, probably throughout its life. The organism does not pass from the infected female to the next generation.

The Aëdes aegypti is one of the most highly domesticated of all mosquitoes and probably on this account prefers human blood. It is a day-biter, and though it may occasionally bite at night in well lighted rooms, this is exceptional. It is very susceptible to temperature, living in tropical and subtropical countries. Its activities lessen when the temperature falls to 68° F. and at 59° F. it becomes so sluggish that it seldom can be induced to take blood.

Its average length of life is probably not more than six weeks, though it may be kept alive for a longer period of time, and has been shown to transmit dengue after 75 days. As in all known cases of transmission of disease by the mosquito, only the female is a carrier.

It is evident from these findings that the prevention of dengue is identical with that of yellow fever. The actual causative organism remains unknown, but with the method of transmission proven, the control of the disease will be easy, except for the facts noted above concerning the lack of danger to life. People must be scared before they will take precaution, and a non-fatal disease, however painful and uncomfortable, is hard to control on account of the apathy of the community in which it occurs.

The success of the Research Board was largely due to the abundance of volunteers, who readily subjected themselves to the painful experiments. They have been already officially commended by the Secretary of War. In the name of

scientists the world over, we wish to add this expression of our appreciation of the courage shown and the sacrifices made by these men, as well as our debt to the officers whose intelligent plans and supervision have added so much to our knowledge.

TETANUS AND VACCINATION

ONE OF THE unfortunate results that has occasionally followed vaccination against smallpox is lockjaw. Before vaccine establishments were put under the supervision of the United States Public Health Service, these accidents were fairly frequent and they occur even now more often than we could wish. It must be recognized that wherever there is an open wound, there must be danger of tetanus. As Pasteur stated: "A pin prick may open the door of death." While it has been reported that tetanus spores have occasionally been found in smallpox vaccine, the great majority of investigations have been negative. At the Hygienic Laboratory in Washington, vaccine from the various manufacturers is constantly being examined for tetanus. These investigations make it quite clear that in the great majority of cases of tetanus, the spores entered the vaccination wound after the operation and were not carried in with the virus.

The United States Public Health Service has for some time past been investigating the problem afresh. It has come to the attention of the Service that bunion pads are used to protect vaccine wounds more frequently than has been supposed, and recently several fatal cases of lockjaw have followed their use. Tests at the Laboratory have demonstrated tetanus spores in bunion pads from the same source as those which were used in the vaccinations followed by tetanus, so that the proof is clearly against these pads.

The Public Health Service advises against the use of any kind of a shield as a dressing following vaccination. A shield retains moisture and heat, prevents evaporation and the escape of any discharge which may be present, obstructs the lymphatic drainage and induces hyperemia. The smallest single site insertion which can be used is recommended.

The occurrence of tetanus following vaccination is one of the drawbacks to the procedure which will have to be met fairly and squarely. Even if the number of deaths from tetanus were one hundred times as great as they are, they would not in way balance the saving of life due to vaccination. Against every death from lockjaw, many hundred lives are saved from smallpox. Deplorable as these accidents are, they are no more a valid argument against vaccination than are the occasional deaths from chloroform, morphine, etc., against the use of these most valuable agents. The anti-vaccinationists will continue to use these cases against vaccination and we must be in a position to refute their charges. We can rest assured that our Public Health Service is alive to the problem, that it will make a thorough investigation and give the facts to the public without reserve.

ASSOCIATION NEWS

BUFFALO, OCTOBER 11–14

NOW that the legions have departed from Atlantic City, the scene of the late American Health Congress, the meeting that engrosses the Association more than any other, and rightly so, because it is thoroughly and entirely its own, looms on the horizon—the Fifty-fifth Annual Meeting.

NIAGARA FALLS—AMERICAN AND CANADIAN
Showing Upper Rapids

The stage is being set in Buffalo this year for the performance of this more than a half century old drama. The scenery is being prepared, and the cast is being assembled. The program will appear in the September issue of the JOURNAL.

In the meantime, it is not amiss to present advance information concerning the scenery and the stage.

Niagara Falls, of course, forms a magnificent back-drop. A special trip will be arranged to visit this loveliest of American traditions, on Tuesday, October 12. Scientific sessions will be short that afternoon to enable delegates to break away easily about 4 o'clock. That hour is chosen for starting so that the Falls can be seen in daylight. Then after dinner the huge searchlights of many colors will be turned on the tumbling waters and delegates will see the famous night illumination. The effect, it is said, is unbelievably beautiful. Almost everybody has been to Niagara Falls at least once, usually on a honeymoon, but unless you have honeymooned there within the last two years, Niagara Falls has something new to show you, because the night illumination is less than two years old.

Canada too must not be overlooked as a background. An invitation to visit Toronto with its excellent health department will probably be extended to the delegates to the meeting.

Buffalo makes an admirable stage. It is a busy, progressive city of over half a million population, full of industrial and scientific interests. Dr. Francis E. Fronczak, Health Officer for many years, and Chairman of the Local Committee, has much to display in public health and civic development.

Some illustrations of Buffalo and the Falls appear here. Watch for the August JOURNAL for information on what to do and what to see in Buffalo. The Statler Hotel will be Association headquarters. If you are planning to stay at the headquarters hotel, reservation had better be made immediately. The August JOURNAL will carry a list of hotels with locations and rates, and a table of railroad fares

BUFFALO IN THE VICINITY OF HOTEL STATLER

from all important points. Identification certificates permitting the reduced fares will be sent to all members on September 7.

Save a few of your vacation days for Buffalo. Buffalo is beautiful in October, and a vacation then would set you up wonderfully for a year's hard work.

HEALTH OFFICERS ATTENTION!

The Chairman of the Public Health Administration Section announces that one of the sessions of the section at the Buffalo meeting will be a Forum Session. This session will be arranged for the discussion of questions of general interest in health administration which may be submitted to the Forum in advance or submitted from the floor. It is being arranged in the belief that many health officers attend Annual Meetings expecting to receive help on some urgent of their local problems. The questions that are submitted in advance of the meeting will be presented first for discussion and all those who have problems that they would like to have discussed at Buffalo are urged to submit them as soon as possible. Such communications should be addressed to Dr. L. I. Harris, Chairman, Public Health Administration Section, American Public Health Association, 370 Seventh Avenue, New York City.

All Fellows of the Public Health Administration Section will be interested to know that the section officers are planning to set aside one whole session at the Annual Meeting to discuss the matter of reorganization of the section. This business session will be limited to Fellows of the section.

NEW YORK HEALTH OFFICERS AT BUFFALO

The annual conference of health officers and public health nurses called by the New York State Health Department will be held this year in Buffalo in connection with the Fifty-fifth Annual Meeting of the American Public Health Association. The New York state law requires the local community to send its health officer to this conference which is usually called by the State Health Officer in the spring, and the conference usually has an attendance of about

HISTORICAL BUILDING, DELAWARE PARK
Only building left standing from Pan-American Exposition

300 health officers and about the same number of public health nurses. This year the State Health Department postponed the calling of this conference so that the New York state health workers in addition to their own sessions can take advantage of the valuable scientific program offered by the American Public Health Association at its Annual Meeting.

NOMINATING COMMITTEE

The President with the approval of the Executive Board has appointed Dr. Herman N. Bundesen, Elizabeth G. Fox and Dr. Watson S. Rankin a Nominating Committee to make nominations for the 10 elective councillors on the Governing Council who must be elected by the Fellowship at the Annual Meeting in Buffalo. The Constitution of the Association specifies that 10 Fellows shall be elected each year by and from the Fellowship of the Association to serve as members of the Governing Council for 3-year terms. It has been customary in the past for the President to appoint a Nominating Committee at the first general session of the Annual Meeting to select candidates for this office, the report of this committee being presented at the second general session of the Association where a *viva voce* vote was taken by all those in attendance. This method, however, gave no assurance that the votes would be cast only by the Fellows and above all gave those voting no opportunity to make a selection of the candidates put in nomination.

The present Nominating Committee has, therefore, been requested to prepare a list of not less than 20 names which list may be printed and ballots distributed to Fellows in attendance at the Annual Meeting. The Nominating Committee will be very glad to receive from members of the Association suggestions for candidates. Such suggestions should be sent to the chairman of the Nominating Committee, Dr. W. S. Rankin, Duke Endowment, Johnston Building, Charlotte, N. C.

LIST OF NEW MEMBERS

Selina S. Anderson, New Britain, Conn., Tuberculosis Nurse

George A. Collins, Denver, Colo., Manager of Department of Health and Charity; Superintendent, Denver General Hospital

Lyda May Degener, A.B., M.A., Ph.D., Aurora, N. Y., Head of Department of Health Education, Wells College

Emmanuel A. deVicq, Los Angeles, Calif., Housing and Sanitary Officer, Los Angeles County Health Department

Jay Dee Dunshee, M.D., Los Angeles, Calif., Director Division of Child Welfare, Los Angeles City Health Department

Allen F. Gillihan, M.D., Sacramento, Calif., District Health Officer, State Board of Health

Edwin B. Godfrey, M.D., Minden, La., Director Webster Parish Health Unit

William M. Happ, B.A., M.D., Los Angeles, Calif., Head of Nutrition Division, Department of Health, Los Angeles City Schools and Pediatrician

Laura G. Jacques, B.S., Portland, Me., Technician

Conrad Kinyoun, A.B., Savannah, Ga., Director Municipal Laboratory

Walter L. Kulp, Ph.D., New Haven, Conn., Instructor, Bacteriology and Research, Yale University

Claude H. Lavinder, M.D., Stapleton, N. Y., Officer, U. S. Public Health Service

Walter C. MacDonald, Los Angeles, Calif., Sanitary and Food Officer and Dairy Inspector, Los Angeles County Health Department

Walter S. Mangold, Monrovia, Calif., Sanitary Officer, Los Angeles County Health Department

Bettie W. McDonald, Louisville, Ky., Superintendent, Louisville Public Health Nursing Association

Francisco Medina, M.C., Mexico, D. F., Chief of the Section of Bacteriology of the Institute of Hygiene

R. R. Miller, M.D., Oregon, Mo., Deputy State Health Commissioner

Glen R. Munger, Los Angeles, Calif., Senior Sanitary Officer

Henry Richards, A.B., Gardiner, Me., President Maine Public Health Association; President Gardiner Public Health Association

Dorothy Rood, A.B., Washington, D. C., Educational Director, Instructive Visiting Nurse Society of Washington

Harry J. Schulman, Ph.B., Chester, Pa., Executive Secretary, Delaware County Tuberculosis Association

Frank R. Shaw, B.E., Grand Canyon, Ariz., Associate Sanitary Engineer, U. S. Public Health Service

Joseph Smith, A.B., M.D., D.N.B., Providence, R. I., Assistant to the Superintendent of Health

H. M. Stansbury, Huntington Park, Calif., Sanitary Officer

Benjamin Swift Stephenson, M.D., Columbus, O., Chief, Educational Bureau of Health, Ohio State Department of Health

A. E. Stuht, M.D., Seattle, Wash., Director of Health, State of Washington

James O. Wails, M.D., Okmulgee, Okla., Director of the Okmulgee County Coöperative Health Unit

John L. White, B.S., M.D., Chicago, Ill., Acting Assistant Director, Bureau of Laboratories, Department of Health

Millard E. Winchester, M.D., Atlanta, Ga., Public Health Administration

FELLOWS ELECTED AT A SPECIAL MEETING OF THE ASSOCIATION HELD AT ATLANTIC CITY, MAY 17–22, 1926

LABORATORY SECTION: Thomas Fort Sellers, Atlanta, Georgia.

VITAL STATISTICS SECTION: James Strode Elston, Hartford, Conn.

PUBLIC HEALTH ENGINEERING: William Firth Wells, Glen Cove, L. I.; Leslie Carl Frank, Montgomery, Ala.

INDUSTRIAL HYGIENE SECTION: Charles T. Graham-Rogers, Brooklyn, N. Y.

FOOD AND DRUGS SECTION: George Webster Grim, Ardmore, Pa.

CHILD HYGIENE SECTION: Clara Edna Hayes, Waubay, S. D.; James Hall Mason Knox, Jr., Baltimore, Md.

HEALTH EDUCATION AND PUBLICITY SECTION: Ray H. Everett, Brooklyn, N. Y.

PUBLIC HEALTH NURSING SECTION: Mary S. Gardner, Providence, R. I.; Anne Lyon Hansen, Buffalo, N. Y.

UNAFFILIATED: Platt Walker Covington, M.D., Salt Lake City, Utah; Hazel Dell Bonness, Helena, Mont.; Laurence Earl Poole, Fairfield, Conn.; John Emerson Monger, Columbus, Ohio.

BOOKS AND REPORTS

The **Pedigree of the Human Race**—*By Harris Hawthorne Wilder. New York: Henry Holt,* 1926. xiv+368 pp., 1 col. pl., 111 figs. Price, $3.25.

This is a zoölogical treatment of man in relation to other primates and to other mammals. There is also a full and critical discussion of fossil men with a quantitative treatment of dimensions, angles, and profiles of the skull. The same type of quantitative analytical treatment is given to the dental arcade, and there is a very interesting discussion of the evidences for the gradual development of the speech center in the third frontal gyrus of the left side of the cerebrum among early fossil men based on casts from fossil skulls.

The structural characteristics of the different races of men are elaborated in detail and a new classification of human types is worked out to the satisfaction of a hypothetical Martian scientist without Caucasian prejudices. There is an interesting account of our living mammalian relatives Pongo, Pan, and Gorilla, a hypothetical ancestral tree up which these anthropoids and man have climbed, and another of the evolution and relations of human races. Unfortunately, there is no mention of disease, infection, or parasites though these must have played a part in the process of the evolution of the Hominidae.

C. A. KOFOID

Population Problems in the United States and Canada *Edited by Louis I. Dublin, Statistician, Metropolitan Life Insurance Company; President, American Statistical Association,* 1924. *Boston and New York: Houghton Mifflin, For the Pollak Foundation for Economic Research,* 1926. 318 pp. Price, $4.00.

The book is the outgrowth of the 86th Annual Meeting of the American Statistical Association held in December, 1924, and is virtually a summary of the papers and discussions presented at that meeting. Of the 21 contributors (not 25 as stated on the jacket) 6 are sociologists, 5 economists, 5 statisticians, 2 anthropologists, and 1 a biologist, all of whom are well known, so their papers are as authoritative as the present state of knowledge permits.

After an informative preface, the book opens with a paper by the editor, the well known statistician of the Metropolitan Life Insurance Company, written in his usual illuminating and sane style. It presents the problem to which the book is devoted so clearly that it cannot be misunderstood by any educated person, though he be not a specialist. The question is discussed from every standpoint, and in the 19 chapters, which are given under 6 headings, one finds an up-to-date and clear statement of one of the most important matters affecting the North American continent. Indeed, in view of the close relation between population and natural resources, immigration, labor supply and health, the statements made are more or less applicable to all nations and the policy of this country in regard to immigration affects directly many parts of Europe.

In a book made up of articles selected by a careful editor, every one of which is well worthwhile, it is difficult and perhaps invidious to commend certain ones. Considering the general class of our readers, however, we believe that the article by Professor Samuel J. Holmes, University of California, on "The Effect of the Health Movement on Future Population" should attract special attention, giving as it does a clear statement of what we are doing to counteract natural selection. Apart from this, the lucid statement by the editor and the chapter by Professor MacIver deserve special mention, the latter being probably the most original and striking article in the volume.

The book can be commended to the careful study of all of those interested in public health, because it deals with a question intimately related to the welfare of the race from every standpoint. We are perhaps too prone to think only of the prevention of disease in our health work, and to neglect consideration of the ultimate results. The

volume before us can be commended for its clearness, sanity and the careful scientific spirit shown by all of the writers. The name of the editor, apart from any other fact, would assure us of the reliable character of the articles.

The book is well printed and of convenient size, but the few errors noted are bad ones, "epidermiologists" for "epidemiologists," and in the table on page 307 we find "0.7" where "40.7" is evidently intended.

M. P. RAVENEL

The Modern Health Books—*By Professor D. Fraser Harris, M.D., D.Sc., B.Sc., General Editor (London), F.R.S. (Edin.). London: Faber & Gwyer, Ltd.*, 1925–1926. Price, 3s. 6d. net each volume, postpaid.

The Modern Health Books, edited by Professor D. Fraser Harris, form a series of small books designed for popular reading and are written in non-technical language.

The first volume, "The House of Health," by Sir John Robertson, is of such excellent character as to impress one favorably for the reading of the rest of the series. The author considers environment as of almost equal importance as the dwelling itself. He recommends narrow streets with wide separation of the houses in order to avoid through traffic. He favors bath rooms for rural cottages, but conditions are such that the time does not seem propitious to advocate the additional expense. He objects strongly to flats for working people. The ideal type of house is the well known Cotswold cottage. Adequate consideration is given to the question of site, soil, orientation and atmosphere. The price of building has practically doubled since 1914, but it seems possible to build a good house in which every condition of health is observed for approximately $2500.

The book is of course written for the English and for English conditions. One can read it with advantage even though its recommendations are not entirely applicable to conditions in other countries. The standard cubic air space is smaller than is generally considered advisable in this country.

The second volume of the series, "Nursing in the Home," is by Dr. Stella Churchill. The facts given are in the main sound. On the one hand she uses language adapted to a low mental age, and on the other goes into discussions and descriptions of symptoms which are entirely above the heads of those for whom the language is adapted. Linseed poultices, which are taboo in this country and regarded as good incubators, are still recommended and directions given for making them. Some of the causes given for diseases are not only unnecessary in a book of this type but misleading. There seems to be no reason why a person nursing in the home should be told that appendicitis is believed by some to be due to the increase in eating of meat. Diphtheria is given as a cause of valvular disease of the heart, and by implication, at least, the desquamation following scarlet fever is considered a means of spreading the disease.

The third book of the series, "The Fight Against Infection," by Colonel G. E. F. Stammers, contains practically nothing calling for criticism. It is written in a breezy and interesting style, which will hold the attention of the young particularly, though older readers will find much to interest them. The ground is well covered. The illustrations are rather crude.

The fourth book of the series on "The Health of the Workers," is by Sir Thomas Oliver, the man who has done so much to better the condition of workers not only in England, but in other countries. A good account of the hazards of the various trades is given with the methods of prevention. It is notorious that the general public knows and cares little about what workingmen in all lines of manufacture are obliged to undergo, and the new hazards which are constantly entering into trades through the extension of our industries. We have seen no statement on this most interesting topic which contains as much sound information in as little space as this book of 224 pages.

The fifth book, "The Child at School," by Sir Leslie MacKenzie, as might have been expected, is one of the best of the series, and indeed one of the best which has come to our attention, considering the compactness of the volume. It is full of sound advice based on long and careful observations. It also takes into consideration questions somewhat outside of those indicated in the title, such as the relation of the school and the family, and the proper time for sending a child to school. Nutrition and medical inspection receive special attention, and the discussion of the principles on which physical education should be based is particularly good.

The sixth volume is "Food, Its Use and Abuse," by Kate Platt, M.D., B.S. The author states in the preface that her object is to be of service to the ordinary woman, who often begins housekeeping in almost complete ignorance with regard to the choice and preparation of food. It is well and interestingly written, and in the main is correct, though there is some looseness in the use of terms. We are repeatedly told that certain foods are "nutritious," some of which are fats and some almost pure starches. Taken in connection with what is said elsewhere concerning nutrition, the use of this word is inexact and confusing. For example, white bread is said to be less nutritious than "whole-meal" brown bread, while biscuits, which are usually made of the pure white flour are also said to be nutritious. The apparent contradictions are, of course, plain to the nutrition expert, but the housewife for whom the book is designed may find it hard to reconcile the various statements.

In referring to refrigeration, on pages 168-169 we find the Centrigrade and Fahrenheit scales used in the same paragraph without any good reason. The Bulgarian bacillus is recommended as the best organism for producing sour milk, though recent researches have shown the marked superiority of the acidophilus.

Three other volumes of this series are in course of preparation, for which we will look with interest. It can be said of all of the volumes so far that they are written for English people and English conditions. The book on food, for example, uses some terms which will not be understood by the average American housewife, and the names of some foods differ from those in common use here. On the whole, however, the series is well considered and well executed and can be commended for the purpose for which it is designed. M. P. RAVENEL

Headache. Its Causes and Treatment—*By Dr. Thomas F. Reilly. Philadelphia: Blakiston,* 1926. 241 pp. Price, $3.00.

Dr. Reilly has made a definite contribution to medical literature and prepared a handy aid to the busy practitioner. He has incorporated the best of current thought on headache and has classified and described this knowledge in a series of chapters sufficiently independent of each other to allow specific reference, and at the same time sufficiently closely coördinated to make a well connected and nicely balanced book.

The anatomy, the more conservative physiological principles and theories are duly treated. One is impressed by the clearness, detail, and logic that is used in describing headache occurring as a symptom in the long list of diseases included. This portion of the book, if it accomplished nothing else, would be a valuable stimulus in impressing the practitioner with the necessity of developing that fast disappearing art, namely, minute detailed observation of the patient himself. Dr. Reilly's book is singularly free from the descriptions of elaborate technical procedures and abounds in instruction in the purely clinical lines of medicine.

The sections devoted to reflex headache are particularly instructive and the application made of Head's Reflex Areas is a common sense one.

The chapters pertaining to treatment are marked by conservatism, common sense, and a due regard for the basic principle of all good treatment, namely, the elimination of cause; not forgetting, however, the relief that all patients demand from the immediate acute distress.

This book is recommended to the student and to the practitioner. A. G. BOWER

Historical, Legal, and Statistical Review of Eugenical Sterilization in the United States—*By H. H. Laughlin. New Haven: American Eugenics Society,* 1926. 75 pp.

Since 1907, twenty-three states have passed legislation providing for some form of eugenical sterilization. The operation of those statutes on this subject which have been allowed to operate and the fate of those which have been contested in the courts are ably summarized by Dr. Laughlin in this 75 page pamphlet. The bulletin is more or less of an up-to-date condensation of the author's 500 page book of 1922. It is divided into 6 sections, beginning with a general discussion of sterilization stressing particularly its legal implications. It also includes tabulations showing the complete chronological list of laws, amendments, executive vetoes, repeals, official legal opinions, board orders, and court decisions relating to eugenical sterilization previous to January 1, 1926; an analysis by states; a statistical summary of the number of sterilizing operations in the various states, which totaled 6,244 up to

July 1, 1925; the present legal status of eugenical sterilization by states; and, finally, the drafts of 2 model state laws, a long and a short one. There is no index.

The author of this bulletin is and always has been an enthusiastic proponent of eugenical sterilization. He believes that it is becoming a conservative and settled principle in attempts to promote the general welfare of the state. Recent court decisions in Virginia and Michigan have upheld the right of the state to enact such laws for the general welfare and it seems likely that similar laws which are non-punitive and have been drafted with due regard to the bill of rights of individuals, will be sustained as legal and constitutional.

This pamphlet presents an interesting, complete and apparently authoritative summary of the present place of eugenical sterilization in American political theory. Sanitarians interested in such measures will find this work of value. J. A. TOBEY

Technique of Hospital Social Service—*Prepared and distributed by the Associated Out-Patient Clinics, 17 West 43d Street, New York City.* 28 pp. Free upon application to the Associated Out-Patient Clinics.

Hospital social work is in a formative stage and the leading hospitals are aiming to provide social service for its ward and clinic patients. The committee has recognized the need of putting down between two covers practical items relating to this comparatively new branch of service. The pamphlet prepared by a committee of the Social Service Section points out the necessity of developing special tactics in dealing with typical cases, such as tuberculosis, cardiac, nutritional and venereal, and of the establishment of a plan linking the hospital social service with the follow-up work.

The pamphlet gives valuable suggestions regarding the organization and chief procedure of hospital social service, the service to patients through contributing to medical care and through certain administrative duties; how it can adequately meet the shortcomings of a community service; determining what outside agencies have had contact with the patients. Not least important is the section devoted to the subject of maintaining standards. Specimen charts for the patient's social history, monthly report of the department, a list for a small working library and other helpful suggestions are included in the appendix. A. B. T.

Indigestion. What It Is and How to Prevent It—*By Arthur L. Holland, M.D., Assistant Professor of Clinical Medicine, Cornell University Medical College. New York: D. Appleton and Company,* 1926. 130 pp. Price, $1.25.

The author has succeeded in producing an admirable book, which though intended for the layman may be read with profit and interest by the average physician. He points out that "the stomach is an alarm box in the abdomen," and shows that the combination of symptoms which are ordinarily spoken of as indigestion are not such in reality, since practically all diseases from the simplest to the most severe affect the behavior of the stomach. The importance of these symptoms is manifest. Incipient tuberculosis constantly produces what passes as a type of indigestion. Valvular disease of the heart and all of the acute infectious diseases produce symptoms referable to the stomach. The writer gives a clear description of these facts and explains the ground work on which they depend.

Two chapters are devoted to prevention: Notes on General Hygiene and Exercise, the latter of which is illustrated by a number of diagrams which are easily understood. The book is well printed on light paper and can be thoroughly commended to all classes of readers. M. P. RAVENEL

Source Book in Health and Physical Education—*By T. D. Wood and Clifford L. Brownell. New York: Macmillan.* 590 pp. Price, $2.50.

This is a rather complete collection of quotations from numerous authors who have written on health, or physical education. These quotations are usually brief and contain the main thought of the author on the topic under discussion.

Being grouped by chapters under such headings as "Historical," "Educational Aims and Objectives," "Range and Types of Activities," "Play," "Sportsmanship," "Methods of Teaching," and "Administration," etc., it offers a ready reference book for the use of students and teachers in this field of education.

Each quotation is followed by the reference by title, author, and page. This, with a bibliography at the end of the book, makes it peculiarly valuable. It should be in the possession of everyone interested in this rapidly developing field of the modern program in education.

CHARLES H. KEENE

A Manual of Hygiene—*By Sir William H. Hamer, M.D., F.R.C.P., D.P.H., and C. W. Hatt, M.D., D.P.H. London: Methuen & Company, Ltd.*, 1925. 821 pp. Price, 1/10s. net.

The authors state in the preface that this book has been designed to meet the needs of those who are seeking a public health diploma. In other words, it is intended as a guide for those expecting to take the examination in England for this diploma. It is based on the "Manual of Hygiene," published in 1902 by the senior author, and may be regarded as a second edition of this book. While it has been written by those whose names appear on the title page as authors, chapters have been contributed, and revisions made, by a number of well known authorities.

In general the book is excellent and well designed, particularly for English readers, but it necessarily contains material of use to those of other countries. The chapters on "Tuberculosis" and on "Sanitary Administration and Sanitary Law," one written and the other revised, by Dr. Niven, are especially good, though in some ways, from the very nature of the case, the latter is one of the least adapted to our needs in the United States. However, since the great sanitary awakening began in England and we have learned so much from her excellent way of doing things, a study of these chapters will well repay American health officers. It might be added that since the differences in culture and virulence between the bovine and the human tubercle bacillus, as well as the proof of the danger to human beings from bovine tuberculosis, were both first demonstrated in America, this fact should have been mentioned in the discussion.

The chief criticisms which can be made are that the authors have adhered too closely to the original book of 1902, and while many additions have been made, bringing the book in some ways up to date, old and outworn statements which do not represent facts as now known are still included. The experiments of Stockard on the effect of alcohol on animals is questioned, though the authors do not appear to be aware of the extension of his experiments, and his conclusions after 13 years of work published in April, 1924, which apparently answers the questions raised.

We are correctly told of the discovery in 1903 that the virus of hog cholera is ultra-visible, yet later in the book experiments done 17 years before on the so-called hog cholera bacillus are quoted as proving certain facts concerning immunity. One may well question the value of giving a method of making diphtheria antitoxin which passed out of use very early, and we are still given as the unit of antitoxin that first proposed by von Behring, which he himself changed very soon after, and which is not in use in any part of the world today, as far as we are aware. The information concerning yellow fever is a curious mixture of modern ideas and old superstitions. A glance at the map would have shown that the disease could not spread northward from the West Indies to California. Indeed the most complete records at hand show that yellow fever has never occurred in California. While a few specimens of the Aëdes aegypti, which the authors call "Stegomyia fasciatus," have been taken on the California coast, the climate is not suited for their successful propagation, so it is very doubtful if an outbreak of yellow fever can ever occur there. "Filth and overcrowding are said to favor the spread of the disease." When the disease breaks out on a ship, it is best to "make with all speed for a region of comparatively low temperature." Not a word is said about draining, oiling, etc., and the decrease in the disease is attributed in part to the absence of European garrisons and fleets from West Indian waters, which lessens the numbers of persons susceptible to the disease!

In view of the recent work on the streptococcus as the cause of scarlet fever, it is interesting to reread the account of the Hendon outbreak in 1885, in which Klein believed that he had definitely traced the source of scarlet fever to milk from a particular farm. From the viscera of affected cows and from the blood of persons suffering with scarlet fever, as well as from the internal organs of persons dying of scarlet fever, he isolated cultures of streptococcus which he believed to be identical with each other, and to which he gave the name "Streptococcus scarlatinae."

The book is well printed and bound, and unusually free from errors, though on page 230 a very unusual one is noted in the inversion of a wood cut. This volume is written in interesting style and the wide experience of the authors as health officers gave it an added value. Its appearance is practically coincident with the retirement of Sir William H. Hamer from the position of Medical Officer of Health of the London County Council which took place on December 31, 1925. M. P. RAVENEL

Psychotherapy. Mental Elements in the Treatment of Disease—*By Edward Wyllys Taylor, M.D., James Jackson, Professor of Neurology, Harvard Medical School, Cambridge, Mass. Cambridge: Harvard University Press,* 1926. 52 pp. Price, $1.00.

This little volume is one of a series of publications which present the substance of public lectures given by members of the staff of Harvard Medical School for the purpose of making available to the reading public authentic information on medical subjects.

Dr. Taylor sets forth in a brief and readable manner the history and present status of the treatment of human illness by mental methods.

Before the scientific age this whole subject was shrouded in mystery and superstition and belief in magical powers controlled principles of treatment. Mental medicine has been particularly resistive to the scientific point of view and it is only within the span of an ordinary lifetime that its various phases have come within the domain of rational thought and study.

The author groups his subject under five general headings which conveniently cover the various periods of the development of psychotherapy:

1. Preceding the Eighteenth Century—Miracles, mysticism, domination of the church.

2. Eighteenth Century—Charlatanism: Mesmer and animal magnetism.

3. Beginnings of Scientific Method—Braid (1842), hypnotism.

4. Clinical Period—Charcot (1878) Hysteria, Janet.

5. Analytical School—Freud, Jung.

The first four topics are sketched briefly in rough outline and are followed by a more detailed and critical discussion of the present situation which is dominated by the analytical school of Freud and Jung.

Dr. Taylor by nature, training and experience, is eminently qualified to bring into this controversial field a sound and unbiased viewpoint. He combines understanding and appreciation with a healthy scepticism, and his presentation will be a distinct aid to the puzzled reader who seeks psychoanalytical orientation in some neutral region between the ecstasies of the Pro's and fury of the Con's.

Wise guidance for both the scientific world and the general public in this important subject of modern times is essential, and men from the medical profession like Bernard Hart and Dr. Taylor can do much to fill the need.

MARTIN D. PECK

Toxicology or Effects of Poisons—*By Frank P. Underhill, Ph.D., Prof. of Pharmacology and Toxicology, School of Medicine, Yale University. Philadelphia: P. Blakiston's Son & Co.,* 1925. 292 pp. Price, $2.25.

This volume has been written with the object of presenting a short, concise description of the effects of poisons upon the human organism, generally omitting the details of chemical reactions involved in isolation and identification, so that the book deals essentially with the *effects* of poisons. The 6 chapters cover the principles of toxicology, inorganic poisons, poisonous gases, metallic poisons, alkaloidal poisons, and miscellaneous organic poisons. The work is academic in character, based on the author's course of lectures. It is meant for medical students and physicians. The subject matter has been gathered from standard textbooks and to some extent from original literature. Usually each poison is taken up according to a set outline, *e.g.*, introductory statement, acute poisoning symptoms, fatal dose, fatal period, post-mortem appearance, treatment, and chronic poisoning. Some of the statements under given headings are exceedingly brief and one feels that, sometimes, the high spots have not been covered.

The author states that references have been limited to the later articles upon a given topic and then usually to those articles containing the earlier literature, but there are many exceptions, *e.g.*, the latest citation to tellurium poisoning is that of Mead and Gies in 1901, the work of Shie and Deeds, 1920, and others having been, apparently, overlooked. Odd statements occur such as, "Poisons are promptly eliminated from the body but are deposited in all the principal organs and tissues," (p. 97); "Perhaps phenol poisoning is more frequent than any other type . . ." (p. 169). Under "Gasoline Fumes," the discussion is limited entirely to the exhaust gas of automobiles, there being no mention of gasoline or its fumes. Blood signs are omitted, perhaps a serious oversight in identifying a condition like carbon monoxide poisoning. Many so-called characteristic phenomena such as the "blue line on the gums" in lead poisoning are overstressed while at the same time no mention is made of "stippling" of red corpuscles in this condition.

Occasional repetitions are present (pp. 37 and 40). The index of 27 pages is thorough but exceedingly strung out. On the other hand, the 6-page discussion on food poisoning is excellent. Perhaps the main value of the work lies in the descriptions of the usual drug poisonings.

EMERY R. HAYHURST

An **Introduction to Cytology**—*By Lester W. Sharp. (2d ed.) New York: McGraw-Hill,* 1926. xiv+581 pp., 210 figs. Price, $5.00.

This deservedly popular and widely used textbook of cytology has undergone extensive revision in the second edition. Since the problems of cellular biology are in the main common to both plants and animals a textbook with its illustrative material drawn from both fields will be doubly useful to the broadly founded biologist of the future. This new edition frankly adopts the organismal theory rather than the cellular basis of treatment of the problems of cytology, a very significant change, and one in harmony with certain movements in immunology, physiology, and endocrinology. The work has great value to any laboratory worker seeking a succinct and lucid account of the main features of cell structures and functions, cell division, the chromosome theory, the mechanism of heredity, sex, hybridization, and the relation of these to evolution. There is an extensive bibliography, fine illustrations (with a few antiques), and a good index.

C. A. KOFOID

Life and Evolution. *An Introduction to General Biology—By S. J. Holmes, Ph.D., Professor of Zoölogy, University of California. New York: Harcourt, Brace,* 1926. 8vo, v+449 pp., 227 ill. Price, $3.50.

This recent book by Dr. Holmes attempts to meet the needs of the student as well as of the general reader.

As an introduction to the subject for the general reader and as a convenient review for those who have already studied biology in the past, this book has certain advantages. The subject of development, for example, is discussed before reproduction. Regeneration and the factors regulating form are discussed before heredity and variations. The study of environmental factors as affecting development is treated before taking up the study of evolution. Undoubtedly, the inclusion of "Evolution" in the title is to some extent influenced by the popular interest during the past year or two in the controversies around this subject. The treatment of this topic follows the usual line, giving first some of the historical aspects of the development of the concept of evolution, followed by the classical presentation of the "Evidences." These sections include, however, a great deal of modern material. As Dr. Holmes points out, the controversies regarding the *how* of evolution deal with methods regarding which we are at least no more ignorant than we are as to the *how* of ontogeny. Nobody questions the fact that a single cell becomes eventually a merchant or a minister. Yet nobody can tell just what happens all along the way to bring about the transformation. The evolutionist does not question descent with modification, although he may admit that he does not know either why like produces like or why modifications arise.

There are a few selected references at the end of each chapter.

There is a glossary of technical terms and a good index.

B. C. G.

Acute Infectious Diseases—*A Handbook for Practitioners and Students. By J. D. Rolleston, M.A., M.D. (Oxon), Senior Assistant Medical Officer, Grove Fever Hospital, London. New York: Physicians and Surgeons Book Company,* 1925. 376 pp. Price, $5.00.

All interested in the acute infectious diseases must rejoice that Dr. Rolleston has given us the benefit of his long experience in this book. Its 376 pages are a veritable mine of information, delightfully written. Though the title states that it is intended for practitioners and students, it contains facts which every health officer needs in his daily work, and on which much of his practice in prevention must be based. Each chapter begins with an unusually concise and clear historical note giving just the necessary information.

The book contains no illustrations, charts or diagrams. The author believes that the bedside is the proper place to study the eruptive diseases, not only the form of the eruption, but also the temperature curves. From the standpoint of the student this omission is possibly open to some criticism, but from the standpoint of public health workers, who are particularly considered in this review, we believe that his choice is

wise, and that the space often given to illustrations could be better used for such text as we find in this work. Only one error affecting the health officer has been observed. In speaking of the Schultz-Charlton "extinction sign," we are told that the injection of "normal" human serum will result in blanching. Since the majority of adults have either had scarlet fever or have become immune to it, serum from the ordinary person may produce this phenomenon, but from the serological standpoint such serum must be designated as "immune" and not normal.

The usefulness of the book would be greater if more stress had been laid on the differential diagnosis between certain diseases, especially chickenpox and smallpox.

The book is well printed on light paper and carries a good index which adds much to its usefulness. We have seen no book which can be more thoroughly recommended to the average health officer within the limits which the author has prescribed for himself.

M. P. RAVENEL

Handbook of Safety and Accident Prevention— *By Fred G. Lange. New York: Engineering Magazine Co.*, 1926. 512 pp. Price, $5.

This book is a curious aggregation of material on safety and accident prevention—good, bad and indifferent. The aim of the author has been to bring together into one volume all the widely scattered material which is essential to a proper understanding of the Safety First movement. The book is meant for students and matured safety engineers as well as foremen, professional engineers, etc. The text of the book was originally prepared in 1922 and, evidently, from collections of material extending back for 10 years prior, most of its statistical contents and many of its abstracts are too old to be of much current value and often too selective. One wonders what value 54 pages of accident statistics of 1914, taken from *Bulletin 75* of the Industrial Commission of New York State, have to the present inquirer (pp. 368–422), and of page after page of particulars such as, under "Fall of person from scaffolds": "Driller, age 28, male. He fell from scaffold." To this old material, it has been thought wise to add as a supplement some 30 pages of more recent school safety, public safety, and automobile accident materials as well as a list of the safety standard projects of the Safety Code Correlating Committee which was reported on January 31, 1925.

In place of a table of contents there is a syllabus but this details only the first 327 pages of the book. The index looks extensive but is not sub-indexed in alphabetical order and many such odd references occur as, "Daily inspection of hoisting ropes (etc.)." Also the care given to the indexing of the first 272 pages is greatly lacking in the remaining 240 pages.

The author implies that the safety engineer is a *practical* authority on about everything connected with the field, for which one must be every kind of an engineer, "a lawyer, statistician, doctor, psychologist, pedagogue, compensation expert, etc." The technical engineer's education is apparently not needed or advisable, although it is acknowledged that in special lines of safety work, such as laboratory testing, the technically trained engineer would probably have an advantage over the practical man. Yet, by the time the supplement is reached, the safety engineer (S.E.) has been recognized as an engineer by the Engineering Division of the National Safety Council and becomes a professional.

It is advocated that for small plants a non-professional nurse who has been trained by a doctor will suffice; in larger plants, or where accidents are numerous or serious, a professional nurse will do: "This insures the proper treatment of injuries." Situations might arise where a doctor is necessary and he may also be secured at a contract rate. "Where sprains and strains are frequent an osteopath is sometimes employed." It is needless to point out that most of this procedure would be construed as practicing medicine without a license and puts the nurse or other unqualified practitioner in grave danger of the law, although we must admit that at the present time this is too often done.

Among commendable features are the author's scheme of analysis of the subject, the schedule of time losses in days as devised by the International Association of Industrial Accident Boards and Commissions (pp. 63–77), the forms and suggestions devised by various safety organizations, the health hazards table compiled by Dublin for the Metropolitan Life Insurance Company (also known as the *U. S. Labor Bulletin No. 306*), the bibliography of standard works and of federal bulletins, Hoffman's charts of industrial accidents, and the automobile statistics compiled by Dublin, as Chairman of the Public Safety Section of the National Safety Council. Many times the

sources of information are not clear, the logic questionable, repetitions frequent and grammatical constructions faulty. The message the author desires to convey could probably have been put into a book of much less dimensions. The printer's art is excellent.

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Directory of Convalescent Homes Serving New York City and Vicinity—*Issued by the Convalescence Service of the Hospital Information Bureau of the United Hospital Fund of New York. Prepared by Pauline Jordan,* 1926. 88 pp.

This directory is meeting the primary aim of the Convalescence Service which is "to develop the field of convalescent care and to make the available resources known throughout the community in order that the maximum use may be made of them." The directory is classified (a) by age and sex limitations of patients requiring care during general convalescence including babies to 2 years, mothers and babies, boys, girls, men and women; (b) by type of condition, cardiac, neuro-mental, orthopaedic, and preventoria; (c) by religion and race. All necessary information is given in telegraphic style.

The directory is valuable to professional social workers and physicians as well as lay persons who are often at a loss how to go about obtaining the information included. Upon request, one copy will be given to any charitable agency, and extra copies may be obtained at 25 cents each.

A. B. T.

The Newer Knowledge of Nutrition—*By E. V. McCollum, Ph.D., Sc.D., and Nina Simmonds, Sc.D., Department of Chemical Hygiene, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md. (3d ed. rev.) New York City: Macmillan,* 1925. 675 pp. Price, $4.25.

This book, first published in 1918, has now reached its third edition, dated 1925. A number of the chapters have been entirely rewritten, some material deleted and new chapters added. The new chapters take up among other things the more recent contributions on diet in relation to resistance to disease, iodine deficiency and goiter, diet and rickets. There are 675 pages in this volume as compared with 449 in the second edition.

This book is a splendid source of material substantiating the importance of diet to general health and vitality. Although the authors speak of it as a presentation of general principles, nevertheless, there is a wealth of detail of value to all public health workers.

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G. T. PALMER

Health, in Home and Neighborhood—*By Maurice A. Bigelow, Ph.D., Professor of Biology and Director of the School of Practical Arts, Teachers College, Columbia University, and Jean Broadhurst, Ph.D., Associate Professor of Biology, Teachers College, Columbia University. New York: Silver, Burdett,* 1924. 328 pp. Price, $.84.

"Health, in Home and Neighborhood" is a textbook to be used for silent reading and class discussion.

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C. M. MUNSON

The Human Body and Health—*Advanced. (Revised.) A textbook of anatomy, applied physiology and practical hygiene. By Alvin Davison, M.S., A.M., Ph.D. New York: American Book Co.*, 1924. 320 pp. Price, $1.16.

The purpose of this book as set forth by the author in his preface is to aid in the prevention of human wretchedness. He apparently feels that there is a correlation, high and positive, between knowledge of the laws governing health and practice of the laws in daily living. This is probably no more true in the field of health than in religion.

As the sub-title indicates, the book is a textbook not of health but of the 3 specific sciences related to health. It is intended for students meeting the subject for the first time, probably in grades 8, 9, or 10. It is a condensed anatomy and physiology which might well have given greater consideration for adaptation to the younger mind.

The book is a revision of an earlier edition published in 1908. Its presentation of body structure is clear and well illustrated and while the presentation of function is broad in scope it is not always modern. For example, the subject of vitamins is omitted entirely and the discussion of the effect of bad air overemphasizes the chemical and underemphasizes the physical effect. The hygiene phase is presented less forcefully than the physiology and anatomy. It might be made more positive and given a greater motivating force.

Suggestions for the teacher are found at the close of each chapter in the form of interesting experiments. The questions preceding these suggestions do not present real situations for the pupil; they test his reading of the subject matter rather than the application of principles learned. W. J. SPENCER

French Edition of Standard Methods of Milk Analysis—As the result of many requests in France for the Standard Methods of Milk Analysis, Professor Porcher, editor and publisher of *Le Lait* has translated the book into French and the translation has been approved by the Committee of Standard Methods of Milk Analysis of the A.P.H.A. The French translation is on sale in cities of France and a few copies can be obtained through the Book Service of the A.P.H.A.

BOOKS RECEIVED DURING MAY, 1926

THE GIST OF EVOLUTION. By Horatio Hackett Newman, Ph.D. New York: Macmillan, 1926. 154 pp. Price, $1.50.

OUR TIMES. The United States 1900–1925. By Mark Sullivan. New York: Scribner. 1926. 610 pp. Price, $5.00.

HISTORICAL, LEGAL, AND STATISTICAL REVIEW OF EUGENICAL STERILIZATION IN THE UNITED STATES. By Harry H. Laughlin. New Haven: The American Eugenics Society, 1926. 75 pp.

A BIPOLAR THEORY OF LIVING PROCESSES. By George W. Crile. New York: Macmillan, 1926. 405 pp. Price, $5.00.

MAN AND WEATHER. By Alexander McAdie. Cambridge: Harvard University Press, 1926. 99 pp. Price, $2.00.

SCIENCE, RELIGION AND REALITY. Various writers. Edited by Joseph Needham. New York: Macmillan, 1925. 396 pp. Price, $2.50.

MANUAL OF PUBLIC HEALTH NURSING. Prepared by The National Organization for Public Health Nursing. New York: Macmillan, 1926. 169 pp. Linen cloth. Price, $1.10.

THE HYGIENE OF THE HOME AND RESPONSIBILITY FOR SEX EDUCATION. By John J. Mullowney, M.D. Boston: The Christopher Publishing House, 1926. 195 pp. Price, $2.00.

A HEALTH EDUCATION PROCEDURE FOR THE GRADES AND GRADE TEACHERS. By Kathleen Wilkinson Wootten. New York: National Tuberculosis Association, 1926. 420 pp. Price, $1.00.

THREE MEN DISCUSS RELATIVITY. By J. W. N. Sullivan. New York: Knopf, 1926. 249 pp. Price, $2.50.

DISEASES OF THE SKIN. Sixth Edition. By Richard L. Sutton, M.D. St. Louis: Mosby, 1926. 1,303 pp. Price, $12.00.

A MANUAL OF NORMAL PHYSICAL SIGNS. By Wyndham B. Blanton, M.D. St. Louis: Mosby, 1926. 215 pp. Price, $2.50.

NURSERY GUIDE FOR MOTHERS AND CHILDREN'S NURSES. Second, Revised Edition. By Louis W. Sauer, Ph.D., M.D. St. Louis: Mosby. 1926. 206 pp. Price, $2.00.

THE THYROID GLAND. By Charles H. Mayo, M.D., and Henry W. Plummer, M.D. St. Louis: Mosby. 1926. 83 pp. Price, $1.75.

KRANKHEITEN UND HYGIENE DER WARMEN LANDER. 2nd Edition. By Reinhold Ruge, Peter Mühlens and Max Zur Verth. Leipzig: Verlag Werner Klinkhardt, 1925. 491 pp. Price, Mk. 30.

FIFTH ANNUAL CANADIAN CONFERENCE ON CHILD WELFARE. Published at the request of the Canadian Council on Child Welfare by the Department of Labour, Canada. Ottawa: 1925. 290 pp.

THE MEANING OF PSYCHOLOGY. By C. K. Ogden. New York: Harper, 1926. 326 pp. Price, $3.00.

THE WHITE SPOTS OF EPILEPSY AND OTHER PHASES OF THE DISEASE. By Edward A. Tracy, M.D. Boston: Howard, 1926. 129 pp. Price, $2.50.

SEWAGE PURIFICATION AND DISPOSAL. Second Edition. By G. Bertram Kershaw. New York: Macmillan, 1925. 364 pp. Price, $6.00.

HEALTH DEPARTMENT REPORTS

IRA V. HISCOCK

Springfield, Mass.—The city seal which graces the title page of the 44th Annual Report of the Springfield Health Department shows that the community was organized as a town in 1636 and as a city in 1852. A population table on page 17 indicates a growth of from 44,179 in 1890 to 129,614 in 1920, and 142,224 in 1925 (State census). The total expenditure of the health department amounted to $1.18 per capita, as shown by a classified expenditure table.

"The prevention of disease, with a better understanding of the laws of health and hygiene, with consequent increased duration of life, which is to be expected, is becoming the main feature of all public health work, and the proper organization of health departments for the systematic development of this great educational work has to deal with the entire range of human life, beginning with prenatal conditions, and extending at least to early adult life. This field of endeavor is so comprehensive that the best results can only be obtained by hearty coöperation on the part of all welfare organizations in order to prevent much duplication of effort and unnecessary expenditure of time and money."

"Life or fire insurance may serve as a protection against personal loss, but does not in any way act in a preventive manner and unless the individual assumes a definite interest and responsibility, by adopting those measures which tend towards the preservation of health in his own person and family, the permanent advancement of community health will be greatly delayed. The important position occupied by the medical profession in this great educational health movement can readily be understood. The remuneration to the medical profession will not be diminished, but increased, as the value of such continual oversight becomes apparent to the individual recipient."

The health department hospital provides accommodations for 75 patients, 35 in the tuberculosis wards and 40 in the wards for other communicable diseases. The admissions for diphtheria represent 45 per cent of the total cases reported, while 24 per cent of the reported scarlet fever cases were thus cared for. An infant mortality rate of 64.6 per 1,000 births was calculated for the year, and this was the lowest ever recorded for this city.

Of the 81,000 quarts of milk used daily, all but 8,000 quarts are pasteurized. A regulation has been adopted requiring that all milk be obtained from tuberculin tested herds or be pasteurized.

Manchester, N. H.—The 1925 Health Department report of Manchester shows at the outset the organization of the department, and the appropriation. Of the total expenditure of $76,433, $29,056 was expended for hospital care, and $15,095 for school medical inspection and dental care. Three infant welfare clinics, 1 tuberculosis clinic and 1 venereal disease clinic are conducted.

Of the 274 admissions to the hospital, 239 were of scarlet fever cases and 13 of diphtheria cases. Deaths from tuberculosis have been declining steadily and a rate of 23 per 100,000 population was recorded in 1924, there having been 19 deaths.

There were 5,745 (or approximately one-third) school children examined during the year and 2,246 (exclusive of dental) defects found. A total of 9,145 children were examined for dental defects and 6,555 were found to have dental defects. The extent of corrective work was gratifying. The number of infant deaths has declined, although the rate has slightly increased, while the birth rate has decreased. An infant mortality rate of 94 is recorded, 52.9 per cent of the deaths occurring under 1 month. Infant mortality has been analyzed by age, cause, month and ward.

Pennsylvania Association of Dairy and Milk Inspectors—The Second Annual Report of the Dairy and Milk Inspectors' Association of Pennsylvania is well printed and illustrated and contains several instructive papers dealing with milk control problems. The report also effectively indicates the value of state or district associations for the study of milk supervision problems peculiar to a given locality. It is noteworthy in this connection that the International Association

of Dairy and Milk Inspectors, in 1925, passed a resolution favoring the establishment of district and state dairy inspectors' associations; the creation of courses of dairy inspection at our agricultural colleges; and the employment by control authorities of properly trained dairy inspectors.

From the address of the secretary of health of Pennsylvania it is learned that within the past year a motor truck has been equipped with apparatus to make such tests as are considered most useful to the milk treatment plants and milk depots supplying small communities in the state. The tuberculin testing of dairy herds is progressing more rapidly because of the increased appropriation for indemnity. "Each community now has a right to insist that the raw milk supplies be obtained from tuberculin tested herds."

A valuable paper by the chief of milk control of the State Department of Health deals with recording thermometers. Here are set down: 1—Requirements for the approval of recording thermometers by the department, 2—Manufacturers of recorders approved, 3—General statement of the manufacturers concerning the construction and operation of recording thermometers, and 4—Instructions for the use of recorders furnished by each manufacturer. Other interesting papers deal with pasteurization problems, including a critical review of *Bulletin 147*, U.S.P.H.S.; the medical examination of milk handlers; ventilation; tuberculosis eradication; and the bacteriological content of washed milk bottles. "Quite conclusive evidence was presented which indicated that an epidemic of typhoid fever was spread in one of the suburban districts of the state through the medium of the unsterilized milk bottle." "In the light of the findings herein presented . . . the committee feels there is no safe standard that can be fixed in the interests of public health other than actual sterility of the milk bottle."

Milbank Memorial Fund—The published report of the Milbank Memorial Fund for the year 1924 is of considerable interest to health administrators, particularly to those who are following the health demonstrations. The report is also interesting in its make-up, because it has been carefully prepared, is well illustrated with tables and graphs, and is printed on soft paper in readable type.

The secretary states at the outset that most of the effort in the health demonstrations thus far has been devoted to completing existing measures for combating the diseases about which procedure is more definitely established. It will be recalled that the New York Health Demonstrations are being conducted in Cattaraugus County, a rural division in southwest New York, with approximately 74,000 residents according to the Federal Census; in Syracuse with some 188,000 people; and in the Bellevue-Yorkville district of the City of New York, where according to the Census estimates there is a population of approximately 212,000.

The infant mortality and diphtheria rates in Cattaraugus County show decreases in 1924 over previous years, and the general death rate was lower than in any other year of the past decade. Very favorable results have been obtained in the prevention and control of tuberculosis. A system of generalized public health nursing is maintained throughout the 6 administrative units into which the county has been divided. This work includes school nursing in 260 local schools as well as home and instructive nursing. The average distance travelled by a nurse per visit was slightly less than 4 miles. Excluding the cost of general administration and the cost of nursing service in the clinics, the average cost per visit was $1.87. "However, if we consider the nursing service solely from the point of view of furnishing successful home visits (that is, visits where patients are found at home and nursing service furnished), the unsuccessful home visits, visits to nurses in the clinics, and visits made by nurses to other persons in the interest of patients should not be included in determining the cost per visit. With the cost of nurses' time spent in schools deducted from the above indicated cost of public health nursing in the county, the average cost per successful home visit was $2.28.

Progress in the discovery of tuberculosis existing in the county is indicated by an increased ratio of reported cases to deaths. Hence in 1922 there were 70 cases of all forms of tuberculosis reported, with 52 deaths (ratio 1.3) while in 1924 there were 320 cases with 50 deaths (ratio 6.4), and this ratio has continued to increase since 1924. One of the most valuable of the case-finding methods has been through physical examinations of

persons at the several clinics maintained at the district stations and sub-stations. Many private physicians have availed themselves of the consultation service of the tuberculosis specialists employed on the staff of the County Department of Health. The programs of the urban health demonstration and of the metropolitan health demonstration are likewise outlined in this report, together with brief accounts of other grants of the Fund.

Three Rivers—The 1925 Report of the Bureau of Health of Three Rivers is prepared in a manner to answer immediately certain questions which occur to a health administrator when he examines the Health Department Report. On the first page appears the staff organization, followed by the budget. The per capita expenditure by the Bureau of Health amounted last year to 33c which is less than that of the previous year because of the transfer of garbage collection to the engineer's department.

From the statistical report it is learned that the birth rate in 1925 was 37.7 per 1,000 population, while the death rate was 14.3 per 1,000 population. Infant mortality has gradually declined since 1915 when the rate was 249 per 1,000 births, the infant mortality rate in 1925 amounting to 163.6. The most frequent cause of death among children under 1 year of age is gastro-enteritis, amounting to 56.5 deaths per 1,000 births. The deaths from prenatal causes amounted to 46.1 per 1,000 births. These figures, however, include deaths of children occurring in "creches" and orphanages. "For certain uncontrollable reasons, the mortality in these institutions is higher than amongst the urban population."

Medical inspection of schools is regularly carried on and considerable attention is apparently given to dental hygiene. Approximately 72 per cent of the total milk supply is pasteurized. The report wisely calls attention to the importance of careful supervision of milk before, as well as after, pasteurization. The health officer concludes his report by recommending, among other things, that there be provided for this city of 30,000 people a hospital for contagious diseases and an analytical laboratory, completion of the organization of milk inspection, and the inauguration and encouragement of immunization against diphtheria.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

ADAMI, J. G. Advance in Medicine with Reference to the Campaign Against Tuberculosis. *Lancet*, 1:22 (May 29), 1926.

An excellent review of Calmette's work in the prophylactic inoculation of infants and calves with attenuated tubercle bacilli.

ARNOLD, LLOYD. The Phenomenon of Bacteriophagy Attracts Attention. *Nation's Health*, 8:5 (May), 1926.

A brief but inclusive summary of the much discussed subject, the bacteriophage. Professor Arnold is inclined not to accept D'Herelle's theory of the phenomenon.

BENJAMIN, P. L. The Mental Hygiene Point of View in the Family Case Work Agency. *Ment. Hyg. Bull.* (National Committee for Mental Hygiene), 4:5 (May), 1926.

The author's plea for a mental hygiene background for social workers applies as well to the public health nurse.

CAIRNS, LAURA. Public School Health Courses Need Radical Reorganization. *Nation's Health*, 8:5 (May), 1926.

A consideration of a test given to 1,823 public school pupils which indicated the need for a scientific basis for school health instruction. Suggested means of improving conditions are given.

DENNY, O. E. The Leprosy Problem in the United States. *Pub. Health Rep.*, 41:20 (May 14), 1926.

A story of federal control measures, with a description of the Carville leprosarium.

DOVE, ANNIE G. Toronto's Forest Schools Restore Children's Health. *Nation's Health*, 8:5 (May), 1926.

The story of the growth of the open air school idea for malnourished children, tuberculosis contacts, and children suffering from chorea.

HARTSOCK, C. L. Iodized Salt in the Prevention of Goiter. *Jour. A. M. A.*, 86:18 (May 1), 1926.

A record of goiter cases in which an exacerbation followed the use of iodized table salt. The author warns against the indiscriminate use of this salt, advocating the periodic administration of iodine only under medical direction.

JARVIS, N. D.; CLOUGH. R. W.; and CLARK, E. D. Salmon in a Diet for the Prophylaxis of Goiter. *Jour. A. M. A.*, 86:18 (May 1), 1926.

Chemical analyses reveal salmon (fresh or canned) to be high in iodine content. This food is more readily and universally available than any other sea food, and its inclusion in the diet of patients is recommended.

KAHN, R. L. The Public Health Value of the Kahn Test. *Mich. Pub. Health* (Michigan Dept. of Health), 9:5 (May), 1926.

A brief history of the development of the precipitation test for the sero-diagnosis of syphilis, and a summary of the advantages of the test over the complement-fixation reaction by a proponent of the former method.

MAYNE, BRUCE. Notes on the Influence of Temperature and Humidity on Oviposition and Early Life of Anopheles. *Pub. Health Rep.*, 41:21 (May 21), 1926.

Some biologic tests of importance in practical mosquito control work.

MELLANBY, EDW. Diet and Disease. *Brit. M. J.*, 3403 (Mar. 20), 1926.

Experimental evidence supporting the contentions that (a) the prevention of caries in deciduous teeth is primarily a nutritional problem, (b) that maternal diet effects the development of rickets in the offspring, and (c) that there is a close relationship between deficient nutrition and susceptibility to infections of the respiratory tract.

MILLER, FLORENCE E. School Sanitation from the School Nurse's Viewpoint. *Am. Phys. Ed. Rev.*, 31:4 (Apr.), 1926.

A consideration of the defects in schoolroom environment which hinder the teaching of proper health habits.

MUSGRAVE, W. E. Is Universal Life Insurance Coming? *Jour. A. M. A.*, 86:21 (May 22), 1926.

A western physician is alarmed by the extension and success of life insurance activities in preventive medicine.

NEWSHOLME, ARTHUR. The Present Position of the Tuberculosis Problem. *Lancet*, 1:22 (May 29), 1926.

Suggestions for future anti-tuberculosis work, based upon a comprehensive study of the problem, given in an address at the University of Chicago by Sir Arthur during his recent American tour.

NICOLL, MATTHIAS. A Survey of Our Present Knowledge of Tetanus and Its Treatment. *N. Y. State J. M.*, 26:9 (May), 1926.

The author attributes the decrease in deaths from tetanus in New York to the more general prophylactic use of antitoxin. Statistics indicate the need for repeated prophylactic doses and suggest the possible value of massive doses.

OLESEN, ROBERT. Endemic Goiter and Intelligence. *Pub. Health Rep.*, 41:21 (May 21), 1926.

A study of 3,769 sixth grade school children in Cincinnati to determine if goiter influences intelligence failed to indicate any significant variations in mentality in normal and thyroid enlarged children (except in those with marked enlargement).

REESE, G. A. New Sewage Treatment Plant at Canton, Ohio. *Amer. City*, 34:6 (June), 1926.

Description of the construction of a modern sewage treatment plant; including screens, grit chambers, sedimentation tanks, dosing tanks, and sprinkling filters.

ROSENAU, M. J.; FELTON, L. D., and ATWATER, R. M. An Epidemiologic Study of Pneumonia and Its Mode of Spread. *Am. J. Hyg.*, 6:3 (May), 1926.

Pneumococcus carriers among pneumonia contacts and a control group are compared, showing a consistent excess of carriers among the contact group—the contacts having the same type of pneumococcus as the cases to which they were exposed. Carriers are shown to be sources of infection, although not as prolific as cases.

SLYE, MAUD. Some Misconceptions Regarding the Relation of Heredity to Cancer and Other Diseases. *Jour. A. M. A.*, 86:21 (May 22), 1926.

A consideration of certain studies in the incidence and inheritability of mouse cancer, in which the author whacks away at what she terms "fundamentalism" as applied to biologic research.

STEVENS, F. A., and DOCHEZ, A. R. Occurrence of Throat Infections with Streptococcus Scarlatinae Without a Rash. *Jour. A. M. A.*, 86:15 (Apr. 10), 1926.

An immunologic study of throat infections occurring late in a scarlet fever outbreak, showing that scarlatinal infections may occur without producing a rash, and in Dick negative cases. This test cannot be considered an index of immunity against throat infections of the scarlatinal streptococcus.

TOWNSEND, J. G. The Public Health Nurse. *Pub. Health Rep.*, 41:15 (Apr. 9), 1926.

Answering the questions of qualifications, salaries, and duties of public health nurses.

WILSON, M. G. The Prevention of Rickets. *Am. J. Dis. Child.*, 31:5 (May), 1926.

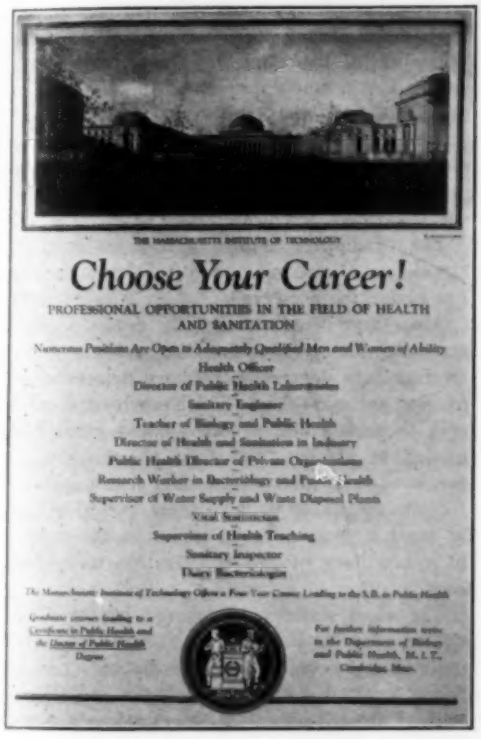
Evidence tending to show that cod liver oil therapy does not have marked influence in preventing rickets in very young infants, but apparently does influence the earlier healing of rachitic conditions.

YOUNG, C. C., and ORR, P. F. Dosage of Toxin for Active Immunization Against Scarlet Fever. *Jour. A. M. A.*, 86:18 (May 1), 1926.

After preliminary trials of 3 large instead of 5 smaller doses of scarlet fever toxin, the authors conclude that immunity can be achieved with 3 doses of 500, 5,000, and 30,000 skin test doses given at intervals of 2 weeks.

PUBLIC HEALTH NOTES

Who **Is Directing the High School Student Toward His Real Job?**—This summer the high school graduate is thinking about the thing he wants to do. One progressive school has adopted the poster to create interest in a public health career among high school students and college students majoring in biology and bacteriology.



Degree of Bachelor of Nursing Given for First Time—The Yale School of Nursing held its first commencement in June and for the first time in the history of Yale University the degree of bachelor of nursing was bestowed upon candidates completing the required course. Those receiving the degree were Miss Mary DuBois Taylor of Freehold, N. J., a graduate of Mount Holyoke College, and Miss Catherine Spaulding, a former student at Mount Holyoke College. Miss Spaulding is the daughter of Professor Frank E. Spaulding, chairman of the department of education, Yale University.

The Yale School of Nursing of Yale University, the first undergraduate school of nursing in the United States, was established in 1923 by a gift from the Rockefeller Foundation.

Health Stressed at Pan-American Red Cross Conference—Delegates from South America, Latin America, Canada and the United States and representatives from European and Asiatic countries attended the second Pan-American Red Cross Conference in Washington, D. C., May 25–June 2. In November, 1923, Red Cross workers from the Americas met in Buenos Aires for the first time for the interchange of ideas and experiences. So profitable was the gathering in South America that a second Pan-American conference was held when the American National Red Cross acted as host in Washington.

At the conclusion of the meeting in Washington the delegates came to New York as guests of the New York County Chapter of Red Cross. During their stay in New York they were guests at dinner of the National Health Council, when the purpose and programs of the organizations of the Council were explained by representatives.

The principal topics of discussion at the Conference in Washington were public health nursing, health education activities of the Junior Red Cross, the Red Cross program in relation to the control and prevention of disease, international relief problems, the organization for disaster relief and the publicity and organization of membership campaigns.

Throughout the week public health was stressed by the speakers. Professor C.-E. A. Winslow, Professor of Public Health, School of Medicine, Yale University, and president of the American Public Health Association, spoke on "The Red Cross as a Peace-Time Health Agency." In part Professor Winslow said:

"The protection of the public health is fundamentally a governmental problem; but it is a problem which requires for its solution not only official action but also the intelligent and active

coöperation of the individual citizen. Modern wars are not waged by armies alone. The munition worker, the transport worker, the miner, the farmer, play a part as essential as that of the soldier. The war against disease must also be a war of the whole people. Water supply and waste disposal systems may be provided and quarantine resolutions enforced by governments, but the most important problems of modern public health—infant mortality, tuberculosis, venereal diseases, cancer—can be solved only with the voluntary coöperation of the individual citizen.

"Our object is to change the daily habits of life of the woman in the home and the man at the desk and the work bench. Such a change cannot be effected by laws but only by the slow process of education. In recognition of this fact the public health movement in the past 10 years has become more and more definitely educational in its very essence.

"It is in connection with this great educational campaign for public health that the Red Cross finds its supreme opportunity for leadership.

"The first objective of the campaign for health education must be the development of a sound and fundamental conception of the laws of health, which will enable each individual man and woman to care intelligently for the wonderful mechanism which we call the human body. . . . The second great objective of our health campaign should therefore be the provision of the health protective machinery of which every community is in need. Here, too, the local Red Cross chapter may prove of supreme value in mobilizing public support for securing such facilities as are needed.

". . . There is on the whole perhaps no single phase of Red Cross health work of more general application than the development of public health nursing; and in this field the district provision of service by the societies must continue for a long period in the future. Public health nursing is the most fundamental element in the modern health campaign; and it presents a problem peculiarly adapted to solution through the medium of the Red Cross. . . . In the campaign against disease, the nurse is not merely an agent for the alleviation of suffering, but also the most powerful force at our disposal for its prevention and control."

Katherine Olmsted, Director, Nursing Division, League of Red Cross Societies, emphasized the need for training of Red Cross nurses. "We all believe very heartily in Red Cross volunteers," said Miss Olmsted, "but we believe equally strongly that volunteer nurses should be as efficiently trained as salaried nurses before being used by Red Cross Societies for any form of nursing or health work."

Committee on Sanitary Conservation of Streams Reports—At the Conference of State Sanitary Engineers in Washington, D. C. May 19, 1926, the Committee on Sanitary Conservation of Streams made its report of progress through its chairman, W. L. Stevenson.

At the outset the Committee stated the scope of its activities to include the promotion of the "health, welfare, comforts and prosperity of the people of the state through control of sewerage and the disposal of sewage and industrial wastes so as to attain the prudent and wise utilization of the water resources."

The Committee claims that the problem of the legislative and executive departments of the state governments is to provide and enforce statutes which will prevent undue and harmful pollution of the water resources and provide for reasonable and proper uses of streams.

The Committee emphatically urges that the cleanliness of streams now in wholesome condition should be preserved.

"Sanitary conservation," it explains, does not mean the treatment of all polluting matter to a high degree but rather a determination of the pollution load which each stream or part thereof can inoffensively and harmlessly assimilate, if any, and then a utilization of the stream to that extent and a requirement for the treatment of all excess pollution load to such a degree as to maintain the stream in a condition fit and suitable for its highest uses.

The ideal statutes formulated by the Committee are: to prevent initial and increasing pollution; to correct existing pollution by police power exerted over the installation and operation of improvements in sewerage works and works for the treatment of sewage and industrial wastes; to secure proper operation of sewage and industrial waste treatment works; to adopt a comprehensive plan for the regulation of the control of stream pollutions applying to drainage areas; to empower state authorities to conduct research and investigations either alone or in coöperation with industry.

The Committee suggests that executive judgment and authority be given the state department of health or a board or commission composed of representatives of the various interests

concerned in the conservation and utilization of the water resources.

In this program of sanitary conservation of streams the Committee also emphasizes the co-operation between state and municipal authorities and industries, between states for the protection of interstate streams, and between states and the federal government.

Proposed Modifications of the Standard Milk Ordinance—At the Conference of State and Provincial Health Authorities of North America held in Washington, D. C., in May the Committee on Uniform Standard Milk Ordinance made its report. The report as given includes 49 proposed modifications of the ordinance.

The report states that the Public Health Service does not insist upon the exact wording of its present Standard Milk Ordinance, but it does emphasize the vital need for the uniform adoption by state health officers of the United States of the ordinance as it now stands or of any modification which is theoretically sound and practically effective.

Proposed modification No. 4 refers to Section 1, Definition O, of the ordinance and suggests certain changes in the phrasing of the ordinance.

The second part of Proposed Modification No. 4 reads, "Change the pasteurization temperature from 142° Fahrenheit to 145° Fahrenheit." It has developed that health officials are equally divided in their support of the two temperatures, but the Committee believes that pending the outcome of future research work the temperature required by the ordinance should be 145° F. because this temperature gives the public the benefit of all doubt from a public health standpoint.

In conclusion the Committee recommends that the Standard Milk Ordinance of the U.S.P.H.S. with the above modifications be adopted by the Conference as a uniform standard for the United States with the understanding that small communities without laboratory facilities may pass the ordinance with the laboratory requirements deleted, and that this be adopted as the "Junior Standard Ordinance."

X-Ray Regulation in New York City Sanitary Code—Recently the Sanitary Code of the New York City Department of Health was amended regarding use of an X-ray machine for diagnosis or other therapeutic purposes. The code with amendment follows:

Sanitary Code and Regulations Governing the Conduct and Maintenance of X-ray Laboratories in the City of New York.

SANITARY CODE

Section 107. No person shall maintain, operate or conduct an X-ray laboratory or advertise or hold out to the public that an X-ray laboratory is maintained, operated or conducted, wherein radiographs are taken, diagnoses made or human beings examined or treated by X-rays, without a permit therefor issued by the Board of Health, or otherwise than in accordance with the terms of said permit and with the Regulations of the said Board. (As adopted by the Board of Health, January 26, 1922.)

Regulations Governing the Conduct and Maintenance of X-ray Laboratories in the City of New York. (Adopted by the Board of Health, January 26, 1922.)

Regulation 1. Information to be furnished by applicant. Every application for a permit to conduct an X-ray laboratory shall be made in writing on an official blank to be furnished by the Health Department and must contain the following information:

Location of building.
Location in building.
Character of building.
Name of owner of building. Address.
Name of applicant. Address.

If a corporation:
(1) When and where incorporated.
(2) In what county certificate has been filed and date filed.
(3) Officers of the corporation.
(4) Place of business of the corporation.
(5) Full and accurate incorporate name.

If a partnership:
(1) Names of persons composing partnership in full, with their places of residence.

If a trade name:
(1) The full names of the person or persons doing business under such trade name.
(2) Complete and full trade name.
(3) Place of filing of certificate as required by the statute, and date filed.

Regulation 2. A duly qualified person to be in charge. Every X-ray laboratory shall at all times be in charge and under the direction of a duly licensed physician or other person who is licensed under the laws of this state to diagnose and treat diseases and whose knowledge, experience and qualifications to operate and use an X-ray machine are satisfactory to the Health Department. (As amended by the Board of Health, February 6, 1926.)

Regulation 3. Precautions against danger. Every X-ray laboratory shall be so constructed as to confine within the operating room the rays emanating from the machine and it shall be equipped with suitable and necessary appliances and devices at all times when the X-ray machine is in operation for the proper protection of patients, operators and all other persons or property adjacent, contiguous to or coming in contact with the electrical or other

current or force or spark generated or incident to the operation and use of the X-ray machine.

Regulation 4. Permits may be revoked in the discretion of the Board of Health.

Regulation 5. No permits shall be transferable as to the person or place. A permit is issued to a particular person, firm or corporation and for a given location and is not valid for use by any other person or in any other place than stated in the application for a permit.

A Health Demonstration from the Clouds —"Health for the Heart of Manhattan" is the title of the illustrated folder recently issued by the Community Health Council of the Bellevue-Yorkville Health Demonstration, New York City, answering concisely the "Who?" "What?" "Why?" and "Where?" of the metropolitan demonstration.

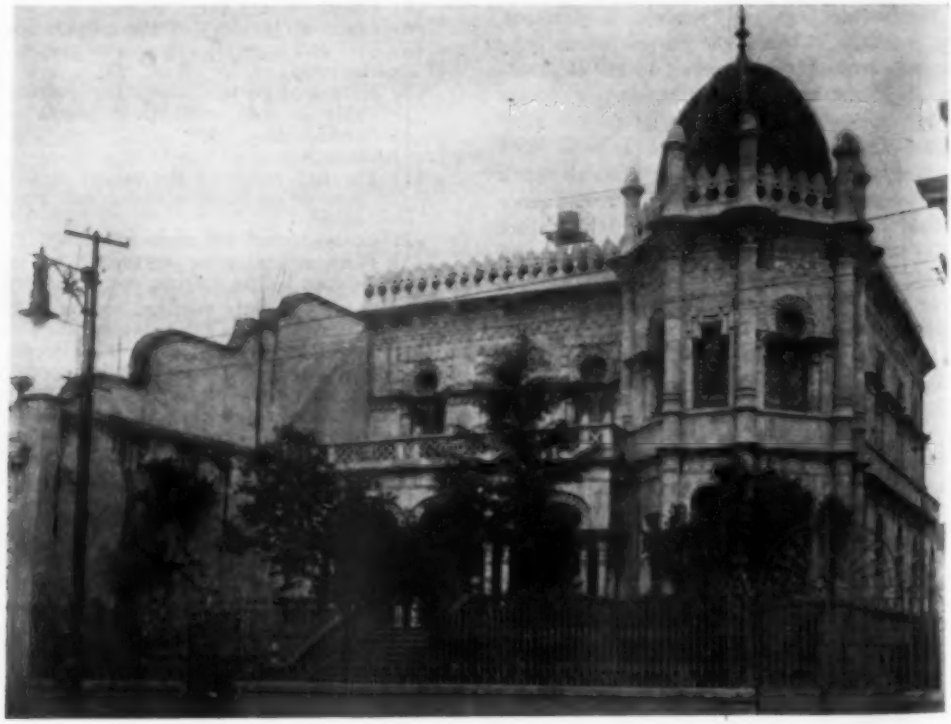
The cover of the folder is an aerial view of New York City showing plainly the district of the demonstration activities.

The first practical work of the demonstration program was the opening in May of the toxin-antitoxin clinic for preschool age children. The clinic is proving a success, for mothers of the district, who, realizing that diphtheria is preventable, are bringing their children for immunization treatment. The Community Health Council is working with the City Department of Health.

SCHOOL OF PUBLIC HEALTH, MEXICO CITY

THE School of Public Health, Mexico City, has just entered upon its second year. This school, established and financed by the Department of Health for the training of the members of its staff, is equipped to take care of its registration of about 200 students. The buildings, attractive in architecture, have modern appointments for laboratory facilities and lecture purposes.

Technical workers, sanitary inspectors, laboratory assistants, inspectors of the bureau of communicable diseases, food and milk inspectors and visiting nurses receive a thorough course in public health work to meet the needs of their individual groups. The School of Public Health is also coöperating with the City Woman's Hospital of Mexico City, extending its instructions to the nurses of the hospital training school.

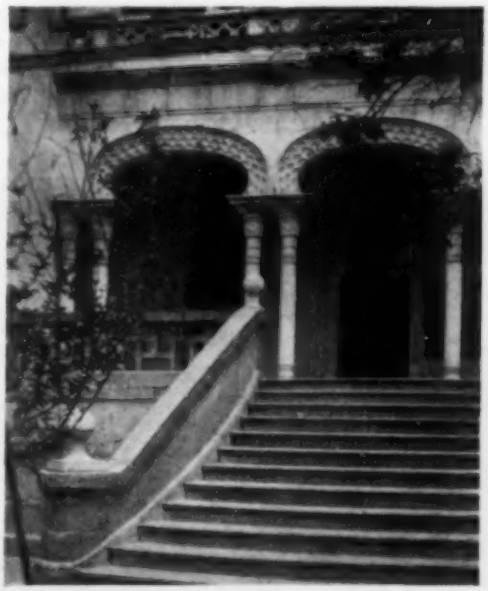


The completely appointed bacteriological laboratory is one of the prides of the school. This laboratory is equipped to serve a class of 15 students, every student being furnished with his own microscope, working equipment and clinical material for study. The school emphasizes the practicability of its courses, and to follow this out, the school demands every laboratory student to perform actual laboratory or clinical problems to supplement his lecture theory.

Mexico City has inaugurated a practical scheme for training its public health workers.

BACTERIOLOGICAL LABORATORY, SCHOOL OF PUBLIC HEALTH, MEXICO CITY

THE LABORATORY IS CONVENIENTLY ARRANGED WITH THE STUDENTS' SPACES ASSIGNED AROUND THE HORSE-SHOE SHAPED WORKING TABLE AND THE PROFESSOR'S PLACE IN THE CENTER



THE ENTRANCE TO THE SCHOOL—A PLEASING BIT OF ARCHITECTURE

LABORATORY

C. C. YOUNG

A CONVENIENT METHOD OF PREPARING LOEFFLER'S BLOOD SERUM IN LARGE QUANTITIES

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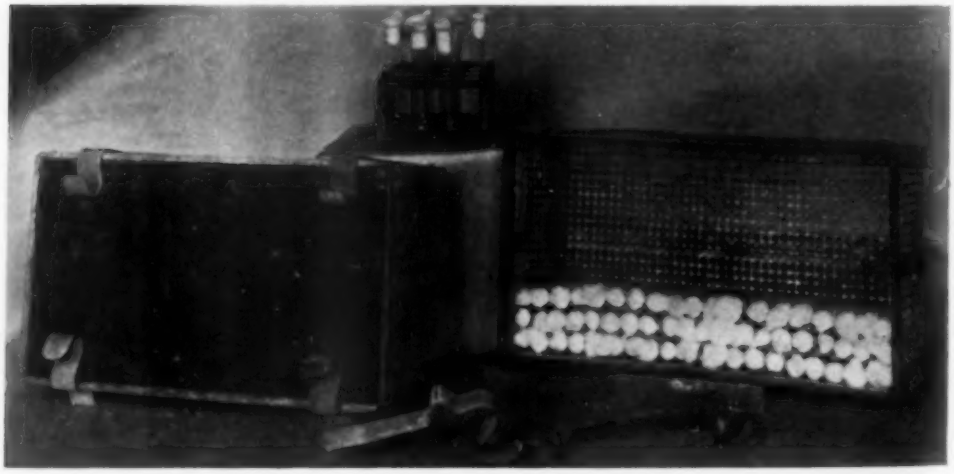
THE method for preparing the jugs for this experiment is simple. The jugs are cleaned thoroughly with chlorinated lime and rinsed thoroughly with cold water. They are then sterilized in the autoclave for 30 minutes at 20 pounds pressure, and 25 cubic centimeters of chloroform are added to each 2-gallon jug.

The blood from the slaughtered steer at the abattoir is caught in galvanized iron tubs which are washed out and steamed before using. The tubs containing the blood are covered and allowed to stand in the icebox at the abattoir from 7 to 10 days to allow the serum to separate from the clot. The clear serum is drawn off with a clean liter cup, and then strained through sterile gauze into the 2-gallon glass jugs. The jugs are brought to the laboratory and another 25 cubic centimeters of chloroform are added to the serum, making a total of 50 cubic centimeters for each 2 gallons. The jugs are placed in the icebox at about 38° F., and the red blood cells are allowed to settle out for at least 1 week before using. This makes the blood serum comparatively clear.

The serum is siphoned from the jugs into a sterile flask and one part of dextrose bouillon is added to every 3 parts of serum, as recommended by Loeffler. The last 2 inches of fluid are not siphoned off from the jugs. The serum is filtered and about 4 cubic centimeters of serum are added to each 4-inch test tube. The tubes are placed in baskets for slanting, and cardboard strips are used to separate the rows of tubes in the baskets to insure the proper slant. A board of light pine without resin, ¾ inch thick, and 13¾ inches by 7½ inches is clamped on top of each basket. This keeps the stoppers from blowing out during sterilization. The clamps are also shaped so as to place the basket in a slanting position.



and in such a position they are placed in the autoclave, and sterilized for about 1½ hours at 20 pounds pressure. The entire process, therefore, is carried out in the autoclave, and this renders the preliminary coagulation in the inspissator unnecessary and saves time in this way. The blood serum tubes are then incubated for 48 hours, and if any contaminated tubes are observed they are discarded. It is important to allow the pressure in the autoclave to go down to a normal atmospheric pressure before opening the valves. We have carried out this method with the autoclave of the American Sterilizer Co.

The accompanying picture shows the apparatus as described in the text. Attention is called to the clamps, which are also used to place the basket in a slanting position, and the board tightly clamped on one of the baskets which is full of test tubes.

GLYCERIN SOLUTION AS A PRESERVATIVE FOR SPECIMENS OF FECES FOR BACTERIOLOGICAL EXAMINATION

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AMONG the problems of public health laboratories receiving specimens from a distance is the preservation of feces to be examined for organisms of the enteric disease group. For the past 6 years 30 per cent glycerin in 0.6 per cent salt solution has been satisfactorily used in the outfits which are distributed from this laboratory for the collection of such specimens. Tests carried on prior to the adoption of this statement is based are not given. Wade, Kelly and Giblin[6] found a brilliant green glycerin solution more satisfactory than the brilliant green bile solution.

The present study was undertaken to determine how long after collection specimens preserved in 30 per cent glycerin remain satisfactory for examination. At the beginning of 1925 it was planned to reëxamine all specimens

TABLE I

VIABILITY OF ORGANISMS OF THE ENTERIC DISEASE GROUP IN 30 PER CENT GLYCERIN SOLUTION

Age of specimens	Specimens known to contain *B. typhosus*		Specimens known to contain *B. paratyphosus*		Specimens known to contain *B. dysenteriae* (Mannite fermenting group)	
	Number of specimens examined	B. typhosus found	Number of specimens examined	B. paratyphosus found	Number of specimens examined	B. dysenteriae found
One week or more after collection	104	104	27	27	17	17
Two weeks or more after collection	103	99	27	25	17	15
Four weeks or more after collection	48	22	20	8	13	6

outfit with artificially inoculated specimens of feces, and specimens from carriers, indicated that *B. typhosus, B. paratyphosus* and *B. dysenteriae* remained viable in the glycerin solution for several days.

Teague and Clurman[1] and Beckler[2] found 30 per cent glycerin satisfactory for preserving *B. typhosus* in feces but they do not report any experience with other organisms of this group. Benians[3] reports similar results with typhoid and paratyphoid bacilli. Havens and Dehler[4] and Welch, Dehler and Havens[5] have recently reported a brilliant green bile solution to be very satisfactory for preserving specimens of feces to be examined for typhoid bacilli. The latter authors also state that this preservative has proved satisfactory for *B. dysenteriae* although the details of the work upon which

of feces found to contain *B. typhosus, B. paratyphosus* or *B. dysenteriae* after keeping them in glycerin solution at room temperature for 1 week, and again after 2 weeks. Due to the pressure of routine work there were times when these examinations could not be made or had to be postponed. For this reason, in 16 instances the organisms originally isolated could not be recovered when the specimens were reëxamined. In such cases the shortest time which elapsed between the collection of the specimen and the first reëxamination in which the organisms were not found was 14 days. Exclusive of these, a series of 148 specimens were reëxamined 1 week or more after collection and the original findings confirmed in every case. (See Table I.)

The majority of the specimens were not

examined later than 2 weeks after collection, but because some of those which were examined showed viable organisms for such a long time, it seemed of interest to include the findings in Table I. In general, the appearance of the plates has shown that the common fecal flora, such as *B. coli*, are destroyed sooner in 30 per cent glycerin than are the organisms of the enteric disease group.

It is unfortunate that *B. dysenteriae* Shiga has not been isolated during the time that this investigation has been in progress. Tests with artificially inoculated specimens of feces showed this organism to be viable for 1 week, but the strain used had been under artificial cultivation for several years. Since the glycerin outfit has been in use, *B. dysenteriae* Shiga has been isolated from 2 specimens of feces received in glycerin. Although this is too small a number upon which to base any conclusions, at least it shows that, when freshly isolated from the body, this organism is not immediately destroyed by 30 per cent glycerin.

It is part of the routine procedure to emulsify in glycerin solution a small amount of every specimen of feces which is received in a jar or tube with no preservative. The plates of selective media are inoculated from this suspension and if no organisms of the enteric disease group are isolated, the emulsion is replated after having been kept in the refrigerator for at least 48 hours. During the past year, *B. typhosus* has been isolated in 5 instances and *B. dysenteriae* in 2, from such specimens after they have stood in the refrigerator for 48 hours or longer when these organisms were not found in the first examination.

The results indicate that 30 per cent glycerin solution can be relied upon to preserve specimens of feces so that *B. typhosus*, *B. paratyphosus* and the mannite fermenting type of *B. dysenteriae* can be isolated for at least 1 week after collection.

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THE LABORATORY DIAGNOSIS OF BOTULISM

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NUMEROUS attempts to find a method for the demonstration of either *Cl. botulinum* or botulinum toxin in canned foods suspected of causing botulism have met with partial success. As a result of 4 years' experience in this laboratory the following methods have been developed and are used at the present time.

A sample of food suspected of causing botulism and submitted for examination may be a small portion in a can or an empty can which has been thrown out with the garbage, it may be obtained from stomach washings from a patient, or it may have been subjected to other treatment before it reaches the laboratory. The delay in collecting the sample is correlated with the incubation period following the ingestion of the toxic food. (Usually from 2 to 4 days.) Often a number of unopened cans either normal in appearance or "swells" from the same pack are received for examination.

The hydrogen ion concentration is first determined, using where possible the Clark and Lub indicators; the potentiometer being used as an alternative. In our experience botulinum toxin has not been found in foods where the pH was lower than 5.4 but it has been reported in more acid solutions.

The next procedure in the examination of a food is to determine the presence of (1) toxin and (2) the organism (*Cl. botulinum*). The sample is centrifugalized at high speed for an hour or two. One-half c.c. portions of the supernatent fluid are then withdrawn and injected into mice, some of the mice being protected respectively with the types A and B antitoxins. Material dried in a can or containing little liquid is ground with sand in a

mortar and diluted with 0.85 per cent sodium chloride solution before centrifugalizing. The dilutions are kept as low as possible. All the reagents and glassware used are first sterilized.

Filtration through a Berkefeld filter is purposely avoided as such treatment is known to reduce the toxicity of botulinum toxin. Where the sample is large and known to be badly contaminated, filtration may be carried out as an additional control. Under these conditions it is often advisable to give orally or subcutaneously some of the material to guinea pigs.

Attempts are made in the following way to isolate botulinum colonies from the sample, thus minimizing the effect of contaminating organisms on the growth and toxin production of *Cl. botulinum*. One portion of the sediment remaining in the centrifuge tubes is heated to 80° C. for 15 minutes to destroy vegetative cells. Streak and pour plates of heated and unheated portions are made in veal infusion agar (pH 7.6) and incubated in a vacuum desiccator under 4 to 6 cm. pressure. Agar shake cultures are also made. After 4 days incubation at 37° C., colonies resembling *Cl. botulinum* are picked and placed in beef heart medium. Upon further incubation (7 to 10 days) some of the fluid from the beef heart cultures is centrifugalized and 0.5 c.c. portions of the supernatent fluid injected intraperitoneally into mice as a test for toxin production.

The following test is made which may be of value in case the number of botulinum organisms is small. The remainder of the sediment from the heated and unheated portions of the sample is placed in tubes or bottles of beef heart medium, which have been rendered anaerobic by boiling and sealing with sterile vaseline, and incubated at 37° C. for 10 days. The liquid from these cultures is centrifugalized and 0.5 c.c. portions of the supernatent fluid are injected intraperitoneally into mice. Proper antitoxin control mice are injected. This method is not without sources of error. It permits other spore-forming anaerobes to develop which may possibly exert some effect on the growth and toxin production of *Cl. botulinum*. Heating of suspensions to 80° C. might affect the remaining flora.

Serologic methods have been tried in the diagnosis of botulism but have not proved entirely successful. Antigens prepared from the supernatent centrifugalized material of vegetables which have been artificially inoculated with *Cl. botulinum* were found to have a high anticomplementary value and the ratio between their antigenic and anticomplementary values was found to be small. Careful standardizations were necessary in order to get results, and the specificity of types was lacking.

The best methods we have at the present time for the laboratory diagnosis of botulism are quite inadequate. Where it is possible to demonstrate toxin the diagnosis is comparatively easy, but failure to demonstrate it leads to a much more perplexing problem—that of isolating and demonstrating the organism.

In the preparation of certain foods in which Cl. botulinum has grown and produced toxin, preliminary cooking may have destroyed a large amount of the toxin present, leaving just enough to produce the disease. No one can predict with certainty whether or not such a food will maintain its toxicity to the time the laboratory examination is made. Often the toxic material has stood for several hours, and in many cases for a few days, between the ingestion of the food and the development of symptoms of botulism. It is not at all uncommon to receive food for a laboratory examination which has been salvaged from a garbage can. No imagination is required to see that a food toxic may be altered to such an extent as to lose toxicity. The possibility of other organisms destroying the toxin after the can is opened has also to be considered. The demonstration of toxin in a suspected food can be taken as evidence that such a food was responsible for the intoxication but failure to demonstrate the toxin in the food does not exclude such a food from being the causative agent. On the other hand the demonstration of *Cl. botulinum* in a food suspected of causing botulism does not necessarily mean that the organism had grown and elaborated its toxin. From extensive soil surveys which have been made, *Cl. botulinum* has been found to be a common inhabitant of certain soils. Little weight can be given to the finding of the organism in non-toxic materials.

If only necropsy material is obtained, cultures should be made using the methods indicated above. The isolation of the organism from such material should not be regarded as sufficient evidence for a definite diagnosis as to the cause of death. The laboratory results must be correlated with the clinical findings.

VITAL STATISTICS

LOUIS I. DUBLIN, PH.D.

Vital Statistics in 1925

Montana—Montana's birth rate of 18.8 was exactly the same as that for 1924. The deaths increased 100 over the previous year. The infant mortality was 69.1 and the maternal mortality 8 per 1,000 live births. Both are slightly higher than the previous year. Deaths from communicable diseases numbered 654. The population of the state is estimated at 533,000.—*Butte Miner*, Apr. 4, 1926.

Palo Alto, California—The annual report of the Palo Alto Health Department shows low death rates and low communicable disease incidence. The 1925 death rate was only 7.4 per 1,000. This is the lowest figure for the last 8 years, excepting 1922 when the rate was 6.9. The death rate from preventable causes in Palo Alto for 1925 was 1.32, this being the lowest rate since 1917. The rate has declined quite steadily since the influenza epidemic of 1918. In recent years the California rate has approximated 4.5, being 4.4 in 1924. Had the Palo Alto death rate from preventable causes been 4.4 in 1925 instead of 1.32, 46 persons would have died from these causes instead of 14. The death rate from tuberculosis in Palo Alto has been below 100 per 100,000 of population since 1911, and in 1925 was 28 per 100,000. There were reported 32.4 cases of communicable disease per 1,000 of population as compared with 31.4 for 1924 and an average of 36.8 for the last 15 years. This includes all cases except influenza.—Cal. State Bd. of Health, *Weekly Bull.*, Mar. 27, 1926.

Vital Statistics and Social Conditions in Denver—An analysis of various phases of the social conditions of Denver has been made, and the conclusions follow: Deaths in Denver reached a maximum at the time of the influenza epidemic in 1918. Recurrences of the epidemic in 1920 and 1922 produced a less disturbing effect. Cyclical peaks in births were reached in 1909, 1913 and 1921. For the last 4 years there has been little change. The present cycle of marriages, as indicated by the number of licenses issued in Denver, reached a peak in 1920 and is now on the decline. The peak in the cycle of divorces occurred in 1920. A decline followed, extending through 1924. In 1925 there was a noticeable increase. The death rate from suicides in 1925, 28.7, was the highest since 1913, when the rate was 32.7. The 1924 rate was 21.6. Over a period of 17 years, male suicides accounted for 74 per cent of the total. The greatest number of suicides occurred in the months of June and August, and in the age groups from 30 to 40. Of 774 male suicides in this period, 377 chose firearms and 193 poison. Of 272 female suicides, by far the greatest number, 140, chose poison. While the 1925 death rate from homicides was fairly low, 6.7, as compared with 11.6 in 1924, homicides appear to be increasing when viewed from 1909 to 1925. The death rate from alcoholism shows a decline over this period. An upward turn after 1919, when only 1 death occurred, reaching a peak in 1922 (10.1 per 100,000), appears to be subsiding again, the 1925 death rate being 2.8. More deaths occur from tuberculosis contracted outside of Colorado than in the state. In 1925 there were 344 deaths in Denver from tuberculosis contracted outside the state, and 98 in which the source was within the state. The origin of 83 could not be traced.—University of Denver, *Business Rev.*, Feb.-Mar., 1926.

Expectation of Life in Massachusetts, 1924—The state of Massachusetts enjoys the distinction of having been the first state in the Union for which a life table was constructed. The earliest Massachusetts table relates to the mortality in the year 1855. The latest data on the expectation of life for that state is that for 1924. These figures are compared with those of the Registration States of 1920 in 1924. For males the two life tables run very closely parallel, the expectation of life being 56.74 at birth for the Registration States and 56.67 for Massachusetts. For females, the Massachusetts table shows an advantage of about one-half year in the expectation of life at birth, being 60.09 as compared with 59.59 for the Registration States. The mean length

of life for the population as a whole has risen from 39.77 in 1855 to 58.32 in 1924, a gain of 18.55 years.—*Stat. Bull.*, Met. L. I. Co., 7:7–8, Mar., 1926.

Deaths from Communicable Diseases in Detroit from 1923 through 1925—Of the 156 deaths from measles in Detroit from 1923 through 1925, 93.59 per cent occurred in children under 7 years of age and 57.05 per cent occurred in the age group 1–4. Whooping cough takes even more of its toll from younger children, for 56.83 per cent of the 227 deaths occurred in children under 1, 40.97 per cent in children 1–4 and 99.12 in children under 7 years of age. Diphtheria deaths under 7 claimed 74.03 per cent of the whole, the age group taking most being 1–4 with 50.31 per cent. Similarly scarlet fever deaths were most numerous in this age group (52.11 per cent), and the per cent of deaths from this disease under 7 was 68.95. Bronchopneumonia deaths under 7 years of age were 69.89 per cent of the whole. Totaling these five diseases it is seen that 73.92 per cent of deaths occurred in children under 7 years of age and 69.42 per cent in children under 5. The preschool age, too long neglected, is taking its toll from these preventable diseases.—*Detroit Weekly Health Review*, April 10, 1926.

Infant Mortality in Arizona—Although the infant mortality rate in Arizona has shown some decrease during the past 6 years, it is still high. The 1925 rate was 132.9 as compared with 130.8 in 1924, 125.4 in 1923, 142.1 in 1922, 136 in 1921 and 154.9 in 1920. During the same period of years the infant mortality, under 1 month of age, fell from 53 in 1920 to 46.75 in 1925. Of these 6 years, only 1923 with a rate of 44.2 showed a lower rate. Infant mortality under 1 year of age for 1925 varied in the 14 counties from 234.4 in Pinal and 202.9 in Navajo to 48.2 in Mohave, 90.9 in Yavapai, and 92.1 in Graham. All of the counties except the last 3 named had an infant mortality of more than 100 in 1925. Of 1,194 infant deaths for the year 1925 in Arizona, 140 occurred during the first 24 hours, 130 more died at the end of the first week, and by the end of the first month 150 had been added, making a total of 420 lost during the first month. In addition, there were 239 stillbirths.—*Bull. Ariz. State Bd. of Health*, Jan., 1926.

Smallpox in American States and Canadian Provinces, 1925—Although fewer cases and deaths from smallpox were reported in 1925 than in 1924, in both the United States and Canada, the disease was even more virulent in the United States than during the preceding year, and nearly 4 times as virulent as in 1923. This is shown by the case-fatality rate in 1925 which was 1.89 deaths per 100 cases in 43 American states, as compared with 1.71 in 1924 and only .52 in 1923. In these 43 states and the District of Columbia, 36,937 cases were reported in 1925, 51,579 in 1924 and 28,343 in 1923. In Canada the case-fatality was .90 in 1925, 2.21 in 1924 and .51 in 1923.

As in 1924, the largest number of cases (4,921) was reported from California. Next followed Alabama with 4,285, Ohio with 4,018, Indiana with 2,996, Washington with 2,004 and North Carolina 1,920. The respective case-fatality rates in these states were 1.18, .44, .97, .17, .20 and .42. It is definitely seen that the disease was not the most virulent in the states where it was most prevalent. In the District of Columbia where the maximum case-fatality was reported (33.9) there were only 59 cases, but 20 deaths. New Jersey reported 189 cases and 48 deaths, and the case-fatality rate was 25.4. Other states where the disease was outstandingly virulent in 1925 were Minnesota, Pennsylvania, Wisconsin and Iowa.—*Stat. Bull.*, M. L. I. Co., 7:4–7, Mar., 1926.

Scottish Vital Statistics for the Entire Year and for the Fourth Quarter of 1925—With the quarterly return of the births, deaths and marriages registered in Scotland during the quarter ending December 31, 1925, there has been issued a preliminary statement regarding the vital statistics for the entire year 1925. The annual figures show a low and falling birth rate, a low marriage rate and a low death rate. The Scottish birth rate of the year was 21.3. This rate is lower than all previously recorded, with two exceptions, those of the 2 war-time years, 1917 and 1918. The annual marriage rate was 6.6 per 1,000, the same as in 1924, but lower than any rate of the years 1918 to 1923. The infant mortality of 91 per 1,000 was 7 less than in 1924 but 12 more than in 1923. It is 8 less than the mean of those of the preceding 10 years.

In the larger burghs taken individually the birth rate of the year ranged from 27.7 in Hamilton, 26.6 in Coatbridge, 24.6 in Glasgow and 24.5 in Greenock, to 17.1 in Perth, 18.0 in Dunfermline, 18.6 in Edinburgh and 20.3 in Ayr. The death rate in the burghs ranged

from 16.7 in Dundee, 14.8 in Glasgow, 14.5 in Edinburgh and 14.3 in Greenock, to 11.4 in Clydebank, 11.5 in Dunfermline, 12.0 in Hamilton and 12.1 in Motherwell and Wishaw, in Ayr and in Falkirk.

The statistics for the quarter ending December 31, 1925, show a birth rate of 20.6, a marriage rate of 6.2, and a death rate of 14.4. The quarterly birth rate and marriage rate are both slightly below those of the fourth quarter of 1924, but the death rate is somewhat higher, 14.4 as against 13.7.—*Med. Off.*, 35:108 (Mar. 13), 1926.

Death Rates in India—The death rates for the last few years in Calcutta and suburbs were 28.4 in 1923; 29.1 in 1922; 33.5 in 1921; 39.4 in 1920, and 42.2 in 1919. The infant mortality rates were 294.6 in 1923, 287 in 1922 and 330.5 in 1921. In Howrah the 1923 death rate was 28.8 as compared with 29.8 in 1922 and the infant mortality was 263.9 as compared with 250.1 in 1922. In Cawnpore City the 1923 death rate was 49.7 as against 44.5 in 1922 and in Cawnpore Cantonment 13.96 in 1923. The infant mortality for Cawnpore City was 476.9 in 1924 and 495.17 in 1923.—*Lancet*, 1:472–473 (Feb. 27), 1926.

The Homicide Record for 1925—The murder record for 1925 seems to be the worst thus far experienced. Preliminary statistics for 77 American cities indicate an increase in the murder death rate from 10.8 per 100,000 in 1924 to 11.1 in 1925. The rate increased in 35 cities and decreased in 40, while in 2 it remained unchanged. The most suggestive increases are the following: The rate for Chicago increased from 17.5 to 18.8, or from 509 deaths in 1924 to 563 in 1925; the rate for Cincinnati increased from 15.3 to 21.3, and for Cleveland, Ohio, there is an increase from 10.7 to 13.6. For Dallas, Texas, there is an increase from 24.5 to 27.3. Jacksonville, Fla., has the highest murder rate on record, 72.3, which is even higher than the Memphis rate for 1923. In Memphis the rate has decreased from 69.7 in 1924 to 59 in 1925, showing a gratifying decrease, although the rate still remains the second highest for our American cities of record. Murder deaths decreased in Birmingham from 136 in 1924 to 112 in 1925 and in Los Angeles from 99 in 1924 to 78 in 1925.

In Italy the homicide rate of 4.9 in 1923 may be compared with the rate for the U. S. Registration Area of 8.1. In England and Wales the rate was 0.7 in 1923.—Frederick L. Hoffman, *Spectator*, 116:3–4, 37–38 (Apr. 1), 1926.

The Increase in Population in France—During 1921–1925 the excess of births over deaths was 414,800 in France, so that the average natural increase in population was 83,000 annually. This is much higher than the average total increase during the 25 years from 1886 to 1911, the date of the last pre-war census, which showed only 55,000 annually, although there was considerable immigration.

There is no foundation for the common belief that the birth rate in France is declining. On the contrary the birth rate last year, 18.7, was very high except when compared with 1920 and 1921, when the birth rate was exceptionally high in consequence of the unusually large numbers of marriages immediately after the war. Unfortunately the death rate last year also was the highest recorded for many years. The French birth rate now is slightly higher than the English rate of 18.3, but the French death rate is far higher and actually is increasing. The real cause of the slow increase in the French population for years has been the high death rate due to lack of public and private hygiene. In all sanitary matters France is far behind any other Western European country, except perhaps Italy.—*Baltimore Sun* (Apr. 12), 1926; *Courier Journal* (Mar. 7), 1926.

Health in Palestine—There were but 2 deaths from malaria last year in Jerusalem, against 113 deaths in the last 9 months of the preceding year. The decreased malaria infection has been brought about partly through the draining of swamps and the conversion of coastal plains into lands suitable for cultivation, partly by a war on mosquitoes for 6 years, which has prevented fresh infections in all of the towns except Haifa, and partly by constant surveillance of the children in the public schools. Trachoma has been reduced among Jewish school children from 35.4 per cent in 1920 to 10.5 per cent in 1925. Smallpox is well under control. Typhus is only sporadic; bubonic plague has been greatly reduced by the rat-proofing of houses and other measures, and no case was reported in Palestine in 1925. Measles, tuberculosis and chickenpox, however, were serious health problems; there were 1,232 deaths from measles among 6,936 cases. Other diseases noted to a great extent in the latest epidemiological report of the League of Nations

are influenza, epidemic ulcer, leprosy and pneumonia. The birth rate noted was 51.3 per 1,000, or an increase of about 4 per cent over the previous year. The infant mortality was 184.8 per 1,000 births. The settled population of Palestine is estimated as 681,245, of which 95,000 are Jews, 505,000 Moslems, and 74,000 Christians; about 103,331 Bedouins wander here and there.—*Jour. A. M. A.*, 86:1300 (Apr. 24), 1926.

Diphtheria Mortality in Large Cities of the United States in 1925—Diphtheria death rates for cities of 100,000 population and over have been calculated for 1925 as compared with 5 year averages beginning with 1890–1894. The New England cities for the most part had very low diphtheria death rates in 1925 as compared with the 1920–1924 average. New Haven, for the second successive year, reported the remarkably low rate of 1.7; Lowell, with a rate of 3.6 showed marked improvement. Worcester again brought up at the foot of the New England cities with a rate of 14.6. The cities in the Middle Atlantic states likewise made an admirable showing, all but 2 having a diphtheria rate in 1925 below the 1920–1924 average. Syracuse had a rate of 2.7 as compared with 22.9 in 1920–1924, Paterson a rate of 4.9 as compared with 18.5 in 1920–1924, and Buffalo a rate of 5.8 as compared with 24.0—all amazing decreases. The South Atlantic states had a somewhat checkered year, Richmond and Washington apparently suffering from diphtheria in 1925 more seriously than for some years, while the other 4 cities, especially Norfolk with a rate of 1.0, showed a notable reduction. Of the 14 East North Central cities only 2 cities had rates greater than 10, and only Milwaukee showed an increase over the 1920–1924 average. The 4 cities in the East South Central states all had a lower rate for 1925, than for 1920–1924. The West North Central cities with one exception showed material reduction in diphtheria mortality in 1925. Minneapolis evidently experienced a rather sharp epidemic, which not only gave it the highest rate of any city for 1925 but the highest reported for the 2 years 1924–1925. Duluth is the first city of this size to have no deaths during a 12 month period. The cities in the West South Central states continued to have low rates. Fort Worth, New Orleans and Houston showed an increase over 1920–1924. The cities in the Mountain and Pacific states showed great divergence. Five showed decreases over 1920–1924 and 4 showed increases. All but 1 showed higher diphtheria mortality in 1920–1924 than in 1915–1919.

The 10 cities with the highest rates for 1925 were Minneapolis, Utica, Camden, Wilmington, Tacoma, Tulsa, Rochester, Richmond, Philadelphia and Denver. The 10 cities with the lowest rates were Duluth, Norfolk, New Haven, Akron, Seattle, Syracuse, Dayton, Memphis, Columbus and Cincinnati. Of the 10 cities with the highest rate in 1924 only 3—Denver, Camden and Minneapolis—appeared in the similar list for 1925, and only 4 of the 10 lowest cities appeared on the lowest list for both years. Of 70 of these cities for which data are available for the 3 years the diphtheria death rate was 9.74 in 1925, 11.05 in 1924 and 13.12 in 1923.—*Jour. A. M. A.*, 86:1005–1007 Apr. 3, 1926.

Kimberley Health Report for 1924–1925—The Kimberley division is 1,764 square miles in extent, and includes the city of Kimberley, Beaconsfield and the rural districts of Warrenton and Ritchie. There are 21,531 Europeans, 9,983 colored and 26,666 natives in the division. In the urban area the European death rate was 12.8, colored 21.8 and native 25.1, while in the rural area the corresponding figures were 5.4, 7.0 and 26.2, all of which show a decline when compared with those of the preceding year. The birth rates in the urban and rural districts also show a wide divergence; for example, the urban colored birth rate in a population of 8,284 is 41.0, but the rural is only 10.6 in a population of 1,699. For the 2 areas combined the rates are: European 23.8, colored 35.8 and native 21.9. The infant mortality rate among Europeans was 89.3, as compared with 77.7 in the previous year; among the colored population the rate was 194.1 as against 197.2, and for natives 330.9 as compared with 541.4. The maternal mortality rate is comparatively low. Infectious diseases do not figure largely as a cause of death. No cases of smallpox, cholera, rabies, leprosy, malta fever, ophthalmia, or sleeping sickness were notified and, for the first time in the history of the city of Kimberley no case of bubonic plague occurred within its precincts. Since plague is endemic in the neighboring territory this is a splendid achievement. In the rural area, however, 8 cases with 5 deaths occurred.—*Med. Off.*, 35:73–74 (Feb. 20), 1926.

PUBLIC HEALTH ENGINEERING

ARTHUR P. MILLER

Additional Water Supply Recommended for Boston and Worcester—A commission provided by the 1924 Massachusetts legislature to review the findings and recommendations of the Joint Board that reported in 1922 on the feasibility of sources of water supply including filtration of the Boston Metropolitan supply has completed its survey. The commission consisted of Charles R. Gow, Consulting Engineer of Boston, Geo. F. Booth of Worcester and E. E. Lockridge, Engineer of the Springfield Water Works.

The summary of the Commission's recommendations is given in this article. They include:

(a) Prompt action to increase the supplies of both Worcester and Boston Metropolitan District which are critically low, with provision of funds to start recommended improvements.

(b) The disapproval of the Joint Board recommendation to use immediately the Ware and the Swift Rivers for the Metropolitan District but instead use the North Ware for Worcester and employ this excess and other nearer sources such as the branches of the Upper Assabet River, the Ipswich above Topsfield and the lower Sudbury by pumping through the Hobbs Brook reservoir enlarged for Boston.

(c) Construction of necessary conduits to bring the additional supplies to the Metropolitan District.

(d) Provision for filtration of the entire present and additional supplies as recommended.

The construction program proposed is divided into three 10-year periods: (1) $47,500,000 for the North Ware project, (2) $24,000,000 for construction of Assabet system, and (3) $14,000,000 for Ipswich and Sudbury River filters.

Comparative estimates of cost of the projects advocated by the Joint Board and of the present plan indicate that the former after necessary adjustments amounts to $98,000,000 spread over 14 years and the latter to $80,000,000 spread over 30 years. The cost per million gallons is substantially the same in either instance—about $490,000—except that the new plan provides for all filtered water. In discussing per capita consumption it is stated that due to "progressive installation of meters, consumption is now only slightly larger than when the works were installed 30 years ago," and since 1920 the per capita use has fallen from 105.4 gallons to 95 gallons in 1924.—*Eng. News-Rec.*, 95:944 (Dec. 10), 1925. Abstracted by J. K. Hoskins.

Eradication of Malaria and Mosquitoes in Illinois—An ambitious program is suggested in the title and justified on the basis of 80 deaths being attributed to malaria annually in a population of over 7 million persons and a land area of 56,043 square miles. The disease appears to be chiefly confined to the 12 southern-most counties, in which 48 of the 80 deaths occurred last year. The reason for this localization of the disease is the similar distribution of the particular mosquito—Anopheles, which is the vehicle for the transmission of the disease.

Admitting the disease to be primarily a rural problem in these 12 southern counties, the state division of sanitary engineering has supervised mosquito control (mainly pestiferous) in over a dozen cities scattered over the state. In 3 of these cities, Carbondale, Herrin and Belleville, there would appear to have been some malaria which was practically or wholly eliminated by the control work.

EDITOR'S NOTE: In the future, the majority of the abstracts contained in this section will be drawn from *Public Health Engineering Abstracts*, a weekly publication issued by the Domestic Quarantine Division of the U. S. Public Health Service and for which material is prepared by sanitary engineers of that service and of state health departments and other persons interested in or connected with public health activities. The JOURNAL wishes to give due credit here to the U. S. Public Health Service and will in each instance credit the original abstractor.

The life history and characteristics of the mosquito (in general) and the methods used for their extermination are briefly discussed. A list of the mosquito control projects accomplished in Illinois since 1922 is given.

[Abstractor's Note: It would seem that the first step would be a separation of control of pestiferous mosquitoes from control of malaria; the second, a clear definition of when, where and under what circumstances malaria is being transmitted in southern Illinois. It would be interesting to know for instance, how many of these deaths attributed to malaria in Illinois have been substantiated by the examination of blood smears for the malarial parasite, and how many have been imported into the state from the endemic centers of the disease lower down in the Mississippi valley.]—A. F. Dappert, *Ill. Health News*, 11:267 (Sept.), 1925. Abstracted by K. F. Maxcy.

The Washing of Sewage Filtering Media—Processes of washing sewage filtering media by machinery at Burnley, Manchester, Halifax, Stoke-on-Trent, Newcastle-under-Lyme, Heston and Isleworth, Sowerby Bridge and Cheswick, and by hand at Heston and Isleworth and Batley, are described and cost data given. A table of similar cost data compiled and published by the Royal Commission on Sewage Disposal in 1905 is given for comparison. Except when due to disintegration or consolidation of the filtering media, loss of capacity may be partially restored by prolonged resting, but when capacity after such resting is less than 20 per cent of the original empty tank capacity it is seldom economical to continue operation without washing media.—H. MacLean Wilson and S. H. Garner, *Surv.*, 68:383 (Nov. 6), 1925. Abstracted by R. E. Thompson.

Mosquitoes Resistant to the Usual Eradication Methods—The writer describes his experiences with two common mosquito pests of Southern Louisiana, namely, Mansonia perturbans, Walker, and Aedes sollicitans, Walker, and indicates the difficulty of coping with these forms in the ordinary manner of sanitation on account of their unusual habits.

Mansonia perturbans in this region requires a full year for its development from egg to imago. It passes its aquatic life at the bottom of the pond attached by its respiratory siphon to plant tissue whence it derives its necessary oxygen. It cannot be reached by any oiling or dust poisoning and therefore, it is necessary to completely eradicate the submerged vegetation of these harboring plants.

Beyer accounts for the swarming hordes of the pestiferous sollicitans not by their wind blown origin from salt marshes but by differences in their breeding habits. He has observed this species emerge from the wet earth surrounding the stems of ornamental plants in a wooden flower box. These plants had been systematically watered sufficiently to sustain development of a number of sollicitans, the pupae and larvae of which he uncovered. Beyer also found the mosquito young in mud under a willow tree in a city park. The mud when placed in water harbored Aedes sollicitans.—Geo. E. Beyer, *Bull. La. St. Bd. of H.*, 16:148 (Sept.), 1925. Abstracted by Bruce Mayne.

New Refuse Destructor at Toronto, Ontario—Brief details are given of the high temperature 4-cell Sterling destructor units installed in 1917, together with data taken from performance records for the year 1924. The reduction in weight of refuse effected was 89.67 and the total cost per ton including all labor and materials, less carrying charges, was 2.5 man-hours. This plant, together with a small low temperature plant of somewhat antique design, were treating approximately 50 per cent of the refuse collected, the remainder being dumped. As dump facilities were becoming remote and the small crematory could not be depended upon to function much longer, a new plant consisting of four 4-cell Sterling units, similar in design to the other plant which has given such satisfactory results, was constructed. This new plant is described and illustrated, and details of capacity and acceptance tests are given. The results obtained have considerably more than fulfilled the requirements specified and have exceeded all expectations.—J. A. Burnett, *Canad. Eng.*, 49:203 (Aug. 11), 1925. Abstracted by R. E. Thompson.

New Sewage Purification Works for Epsom—The new Simplex surface aeration activated sludge plant which has given satisfactory results since put into commission 10

weeks ago is described and illustrated. The plant was designed to treat a d.w.f. of 500,000 gals. per day, and consists of detritus tanks, sedimentation tanks and aeration tanks. The effluent is finally treated on existing contact beds, the overall purification being as high as 96 per cent.

The total power required to operate the plant is 7.25 h.p. per 500,000 gals., and the cost of power 1 d. per unit. Recent experiments indicate that better results are obtained without preliminary sedimentation, the heavier solids materially aiding in prevention of sludge bulking, and plans have been prepared for converting the sedimentation tanks into aeration units, thus increasing the capacity of the plant. The present aerating capacity is equivalent to 15¼ hours retention of the d.w.f.

The plant is the first scheme involving the "Simplex" system for which a loan has been sanctioned by the Ministry of Health. The sewage of the district was formerly purified by septic tank treatment, broad irrigation, and final treatment on contact beds.—E. R. Capon, *Surv.*, 68:315 (Oct. 16), 1925. Abstracted by R. E. Thompson.

Relative Values of Methods of Enumerating Bacteria in Air—This is a report on comparative studies of instruments for sampling bacteria in air conducted at the U. S. Bureau of Mines Experiment Station.

The following instruments were tested: the Anderson-Armspach dust determinator, the Greenburg-Smith impinger, the sugar tube, and a modified water aeroscope designed by the junior author.

The instruments were grouped together under a hood and suspensions of *B. coli* and *staphylococcus albus* were sprayed into the atmosphere which was kept in continuous motion. Under these conditions simultaneous samples were taken. The rate of sampling was 0.4 cu. ft. per minute with all instruments except the impinger which sampled at the rate of 1.0 cu. ft. per minute.

The authors found the sugar tube method to be impractical. Sterilization of the sugar ruins its filtering powers. The impinger yielded exceedingly low results. The organisms being found with this instrument were not those sprayed into the chamber atmosphere. It is the opinion of the authors that the high pressure jet of the impinger kills the organisms present. The filter paper method of Anderson and Armspach was found to be 10 times more efficient than the standard sand tube, but in this method contamination takes place relatively easily. And lastly, the water aeroscope method of the authors was found to be about 10 times more efficient than the standard sand tube and has the advantage of being simply prepared and is not easily contaminated.—W. J. McConnell and B. G. H. Thomas, *Pub. Health Rep.*, 40:2167 (Oct. 9), 1925. Abstracted by Leonard Greenburg.

The Sewage Treatment Works of Syracuse, N. Y.—All domestic sewage and storm water from the City of Syracuse, N. Y., is collected at one point by two large interceptor sewers. The sewage treatment works are designed to handle 27.5 m.g.d., the estimated 1940 dry weather flow, and a maximum wet weather flow of 55 m.g.d. All flow in excess of 55 m.g.d. is by-passed at an overflow chamber.

The treatment plant is located on reclaimed land along Onondaga Lake and consists of coarse bar screens (2½" spacing), grit chambers, mechanically raked screens, bar screens with ½" clear spacing, pumping station, settling tanks and Dorr clarifier. The final treatment is that of dilution in Onondaga Lake. Preceding the entire plant and the settling tanks, respectively, venturi meters were installed to measure the rates of flow.

The settling tanks, 4 in number, are square, measuring 77′ on a side at the water level, and have a depth of 10.5′ at the center of sloping bottom. The flow is directly across the tanks. The effective capacity of tanks provides a one-hour detention for the average flow, which was found through experiments to work very satisfactorily with continual sludge removal. A feature of the plant is its operation through one operating board.—*Am. City*, 33:356 (Oct. 25), 1925. Abstracted by R. J. Faust.

INDUSTRIAL HYGIENE

EMERY R. HAYHURST, M.D.*

Carbon **Monoxide Poisoning**—1. In dogs suffering from carbon monoxide asphyxia the difference in elimination time between oxygen treated and oxygen plus 5 per cent carbon dioxide treated subjects is slight.

2. Since the rate of elimination under pure oxygen is almost as rapid as with the oxygen plus 5 per cent carbon dioxide and since the oxygen treatment is more readily available, it is recommended that its use be continued, particularly in localities where transportation is difficult.

3. The air plus 5 per cent carbon dioxide treatment should be of value for rescue parties sent to inaccessible mines and especially in military operations (Authors' conclusions).—Walton, Eldridge, Allen, Witherspoon (Edgewood Arsenal), *Archiv. Int. Med.*, 37, 3:398–407 (Mar. 15), 1926.

Clinical **Lead Poisoning**—The records of the hospitals in one city having a population of less than 75,000 were searched for lead poisoning, and 163 cases were found, nearly all of which occurred in one industry, were treated by one physician, and went to one hospital. The industry is a storage battery plant. In 58 cases, the shortest time of exposure before symptoms began was 14 days—a man engaged in filing lead plates who sustained a loss of time due to illness of 31 days. The longest period of exposure was 4 years and 6 months—a lead burner. In 107 hospital cases where blood examinations were made, the hemoglobin averaged 70, the red count 4,375,000 and the white count 11,200. The highest red count was 6,200,000 and 22 of the 107 cases had normal counts. The lowest white cell count was 5,000 and the highest 22,800. Ten cases had a white count above 16,000. In 101 of the cases temperature was recorded and in 78 of these there was a fever averaging slightly over 1 degree, while in 23 the temperature was subnormal (as a predominating feature). Most of the cases occurred in the winter months. The average age was 33 years. In 45 cases studied, an average of 6 months of exposure occurred before acute symptoms appeared. The first symptom in all cases was abdominal pain of a cramp-like nature and was the reason for the workman's call at the doctor's office in the plant. There were no consistent records of lead line on the gums. Examinations of the urine for lead and of the blood for stippling had not been made.

The treatment of acute lead poisoning begins with the removal of the patient from all contact with lead. Cleansing hot baths, hot fomentations to the abdomen for relief of pain, morphine hypodermically to relieve the pain, cathartic by mouth, bicarbonate of soda in warm enemas, aperient waters, and milk by mouth, potassium iodide (with caution), are all regular forms of treatment. Phosphoric acid as a drink will eliminate lead about 4 times as fast as potassium iodide. Sodium iodide may be used intravenously in cases of wrist drop or palsy, for which electricity and exercises of muscles are also indicated.—Robert S. McBirney, *Proc. 9th Annual N. Y. State Indust. Safety Congress*, pp. 215–222 (published 1926).

Women in Dusty Trades—Women are also exposed to harmful dusts, especially siliceous. In 153 factories comprising over 20 industries in which silica dust in some form is present, 7,680 men and 870 women were found employed. Of the women about 400 were working at essentially dusty operations, as compared to about 5,000 men. The industries employing women thuswise were pottery, tableware, electrical porcelain, insulators, sand paper, scouring powders, abrasive soaps, cleansers, and several branches of the glass industry. (The article has several illustrations.)—Minnie M. McMahon, *Indus. Hyg. Bull.*, N. Y. State Dept. of Labor (124 E. 28th St., New York City), (Apr.), 1926.

Compensation for Occupational Diseases—This bulletin of 76 pages gives a comparative analysis of national legislation on this subject

* The editor of this Section will gladly receive contributions from members. Please address all communications to Hartman-Ohio Bldg., Columbus, O.

throughout the world. The first part includes a statement of the question, the need for compensation, definitions, general principles, the responsibility of employers, and the rôle of the doctor. The second part covers compensation on the lines of accident insurance as found in 15 different countries, and the special form of compensation which obtains in Belgium and Austria.

"It must be acknowledged that occupations become a source of misfortune to those engaged in them and that, encountering the worst forms of disease where they hoped to gain sustenance for themselves and their families, workers die cursing their thankless calling." These words were written in 1701 by Ramazzini, the Father of Industrial Medicine. The American expert, Frederick Hoffman, holds that this problem should be solved in a spirit of reasonableness and conciliation rather than on an abstract legal basis or strictly on the lines of legal definition. Gilbert's view is that the diseases to be regarded as occupational are "those which occur with unusual frequency in a particular occupation together with those which are manifestly due to occupational risk." Definitions by several others are also given. An interesting table on page 13 distinguishes between occupational diseases and accidents as regards the features of the origin, nature and time, pathogenesis, evolution, character of the work, individuality and death.

The schedules of diseases listed by various countries are given and discussed. Silicosis is compensated in most countries and in several of the Canadian provinces, but nowhere in the United States (as a scheduled disease). In Alberta in 1925, frostbite was added to the list, while in British Columbia poisoning by sulphur in coal mines was added in 1922. In New Brunswick by the Act of 1918 all diseases are covered which are due to the nature of the occupation. Ontario specifies, in regard to silicosis, "miners' phthisis," "stone workers' or grinders' phthisis." "Sunstroke" is allowed in a number of states in the United States.

"As we said at the beginning, occupational disease is the inevitable outcome of unhealthy work, but it would not be inevitable if the employer chose, for it is not a vital industrial necessity. It can be avoided, since the causes are even better known than those of accidents, for in disease the determining factor is to be found in the conditions of work or in the machine utilized therein.

"This is why it has repeatedly been said that unhealthy conditions in industry can be tolerated up to a certain point and no further, that is to say, up to the point beyond which the workers' sacred right to life would be violated, and if any work or any product inevitably kills the worker it must be abolished.

"But at the present day we are entitled to say that with coöperation on the part of employers and employees, the assistance of science and modern technical knowledge, and the unremitting progress of medicine, we can and should look forward with confidence to healthier and more humane conditions of work in the future."—Internat'l Labor Office, *Studies and Reports, Series M* (Social Insurance), No. 3, Geneva, Switzerland, 1925.

Medical Service in Industry Making Great Strides—The National Industrial Conference Board recently made a survey of the subject of medical attention to the health of employes in 500 industrial establishments with an annual expenditure for same exceeding $5,000,000. Practically all of this has grown up within the last 10 or 15 years. Workmen's compensation laws have been an important cause. Employers found that the conservation of labor energy was not only socially desirable but that it was profitable. Human interest also stimulated the question. The size of the establishment is important since at the present time only the larger establishments have the highly organized service as a rule. Physical examinations were required in 256 of the establishments but the character of these was found to vary greatly from plant to plant, the average time ranging from 10 to 15 minutes. Such examinations play an important part in placement, lessening accidents and protecting impaired workmen and their fellow workers. Many industrial physicians have the responsibility for sanitation, ventilation, and lighting methods, as well as health education and first aid instruction. In a survey covering 207 establishments in 1920, it was found that the average annual cost per employe was $4.43. A recent investigation of 447 establishments employing 1,031,279 workers showed this cost to be $5.14, the increase probably being due to increase in the scope and functions of medical departments. Mining injuries cost most, but a reduction has taken place from $24.40 in 1920 to $13.87 in 1924. Salaries of physicians and nurses constitute about 70 per cent of the total expenditures for medical services. It has been found that the result is an actual reduction in the number of accidents,

in the number of infections resulting from injuries, and in absenteeism, while the efficiency of workers has increased. At the same time these medical services benefit the public health since they tend to check the inception and spread of disease and also reduce one of the chief causes of poverty. The Conference Board of Physicians in Industry has adopted a standardized medical terminology.—M. W. Alexander, *Hospital Management*, 21, 5:58–59 (May), 1926.

Accidents and Illness in the Western Electric Company—In 1925 the employes of the Western Electric Company lost 115 years through disablement due to accidents, and nearly 5 times this amount (534 years) from sickness, all of this among employes with 2 years' service and over, and based on absenteeism lasting 1 week or more. The chief causes of accidents were, in descending order: objects striking, crushing or jamming (538), slivers and pointed objects (267), machinery (254), lifting (251), falls or stumbling (123), burns (97), hand tools (94), vehicles (93), falling objects (41), and all others (230). As to days of disability, lifting, etc., came easily first (10,710), objects striking, crushing or jamming, second (7,998), machinery, third (4,806), etc. An analysis of sickness disablement showed influenza to lead in both the number of cases (787), and the days of disability (21,890); bronchitis and pleurisy, 532 cases, and 19,796 days of disability; and tonsillitis and sore throat, 411 cases with 9,713 days lost. After the respiratory groups just cited, nervous diseases came next with 312 cases and 16,749 days of disability; appendicitis next with 238 cases, and 11,599 days disability.—J. B. Gibson, *West. Electric News*, 15, 3:12 (May), 1926.

Analysis of Siliceous Dust Samples—A representative group of industrial dust samples were analyzed to determine the percentage of total silica and the percentage of very fine dust (below 10 microns diameter). An accompanying table shows that the percentages in various dusts varied enormously, 0.30 to 97.99 for silica content, and from 0.1 to 49.9 per cent very fine dust. The methods of making the analyses are described. The samples included: Granite dust, sand blast dust, construction sand, porcelain, quartzite, flint, glass sand, pumice, quartz, slate, brick, sand paper, cryolite, glass, kieselguhr, emery, carborundum, and synthetic gypsum. The author quotes Watkins-Pitchford to the effect that "Little, if any, physiological selection takes place, either in respect of the chemical nature or shape of the mineral particles which are deposited in the lung tissues; the only physiological selection which appears to occur is in the matter of size." It was found that the so-called cyclone separator does not separate the fine injurious dust from the air so that the re-use of sand in sandblasting becomes more and more dangerous as the sand becomes finer. Fresh unused sand is not injurious. Every sand blast outfit, therefore, should have some means to separate very fine dust from the larger particles before the sand is used over again. Fine crystalline silica is regarded as the dangerous kind (Professor Beattie). The term "free silica" according to J. W. Mellor, an internationally known chemist, should be more carefully defined as, usually, "acid insoluble, crystalline silica," is meant. In the present work the dangerous crystalline silica, as defined, was found in all granite dust samples, sandblast samples, construction sand, powdered quartzite, all of the flint samples, quartz and glass sand. Carroll M. Salls, Ph.D., *Indus. Hyg. Bull.*, N. Y. State Dept. of Labor (Mar.), 1926.

Safe Occupations for the Aged Worker—It is profitable financially to capitalize the assets of the superior knowledge and skill, as well as dependability, sane viewpoint on labor relations, and the ability to train apprentices of aged workers. A wall balanced economic production demands that such men shall not be pensioned or placed at non-productive labor too soon. Many times a shift to other work that amounts to real promotion brings surprising results. The worker himself should have something to say about such changes. Among the disablement to be considered are failing eyesight which begins to be noticeable between 42 and 45 years of age, when proper spectacles should be obtained; fatigue shown by slower movements and requiring chairs or footrests and the elimination of useless manual labor; a tendency to become suddenly ill or faint at times, requiring safer surroundings; lessened acuteness of hearing; and an unusual number of infection cases in men over 50. Only 17 per cent of compensation cases occurred in men over 50 years of age, and an analysis of causes showed that the majority were at the wrong kind of work, or under faulty conditions.—L. J. Carey (Mich. Mutual Liability Co.), *Nat'l Safety News*, 8, 4:21 (Apr.), 1926.

"Occupation and Health"—In a previous issue the abstractor has listed the titles of 21 industrial poisons and hazardous occupations analyzed by the International Labor Office. Two more numbers have been received including brochures upon the following subjects:

No. 22—Poisonous Woods
No. 23—Calcium Cyanamide
No. 24—Superphosphate Industry
No. 25—Ankylostomiasis or Hookworm Disease
No. 26—Rubber or India-rubber Industry
No. 27—Asbestos
No. 28—Felt Hat Industry
No. 29—Methyl Bromide
No. 30—Artificial Silk
No. 31—Sulphur Dioxide
No. 32—Breweries
No. 33—Acetanilide, Acetic Acid, Acetic Aldehyde, Acetone
No. 34—Chlorine
No. 35—Foot and Mouth Disease

—Obtainable from *World Peace Foundation*, 40 Mt. Vernon St., Boston 9, Mass. (1926).

Occupational Cancer—Cancer follows continued injuries and chronic irritation in persons engaged in industry just as in the general population; for example, cancer of the shins in engine drivers exposed to radiant heat, and in scars following burns by sulphuric acid, but these occurrences are quite exceptional. Collis and Greenwood (*Health of the Industrial Worker*) state that (1) cancer is rare among primitive races, but under conditions that produce cancer in the white races, negroes become similarly afflicted; (2) cancer is absolutely on the increase; (3) it is less frequent in rural communities where it also occurs later in life; (4) it is more marked in the poorer classes; (5) except for special liability of female organs to cancer, it is everywhere more frequent in males than in females; and (6) it is more prevalent the further northward one removes from the Equator (at least in urban populations). Four classes of substances have been impugned in its causation: (1) arsenic and arseniferous ores; (2) soot, pitch, and gas-tar; (3) mineral oils and asphalt; and (4) aniline dyes and dye-intermediates. (The paper shows a table of occupation in relation to cancer frequency.) Alcohol strongly predisposes to cancer and waiters and public-house owners suffer especially from cancer of the oesophagus. The affliction is prominent among metal workers, especially zinc workers, with tin-plate workers in a second position, but iron workers do not suffer a heavy cancer mortality. Coal miners and agriculturists have low figures. The trades in general occupy an intermediate position. The clinical observer and the statistician note certain facts which it is the work of the laboratory investigator to examine. The association of cancer with arsenic and with aromatic amido-bases is of much interest, yet the case against arsenic has never been brought to experimental proof, although the influence of arsenic is wider than has been allowed by many.—C. O. Stallybrass, *J. State Med.*, 34, 5:249–268 (May), 1926.

White Working Population of Tropical Queensland—The author discusses the welfare of the resident white working population of the coastal flats of Queensland and, among other things, concludes that for both sexes and all ages there is no indication that the tropical climate affects the white man deleteriously *per se*. On the contrary, in spite of the worst conditions the high standard of health is still maintained. "The old canard that the white man cannot live in the tropics is definitely exploded. That the white woman cannot live and bear children there is disproved by the excellent figures shown in relation to each of the towns." Similarly, children thrive quite as well as elsewhere. The chief dangers are the endemic preventable diseases and a co-resident native population in certain tropical countries, both of which are subject to quite complete control.—R. W. Cilento, *Health*, Australia, pp. 33–35 (Mar.), 1926.

Papers on Carbon Monoxide Poisoning—In the May, 1926, issue of the New York *Ind. Hyg. Bulletin* (see address above) appear special papers under the title above by C. T. Graham-Rogers, M.D., Carroll M. Salls, Ph.D., and Robert S. McBirney, M.D.

FOOD AND DRUGS

WALTER S. FRISBIE

Possibilities and Limitations of Chloropicrin as a Fumigant for Cereal Products—Chloropicrin is highly toxic to insects. When chloropicrin is present in flour deleterious effects are noted in the bread produced from such flour. These effects are due to the ability of the chloropicrin to retard fermentation and to affect in a harmful manner the physical condition of the gluten-forming products. When flours or wheats treated with chloropicrin are exposed to the atmosphere for sufficient time the chloropicrin disappears from them. Fumigated flours given proper exposure to the atmosphere show complete recovery from the chloropicrin treatment.—N. N. Chapman and A. A. Johnson, *J. Agri. Res.*, 31, 8:745, 1925.

Dulcitol as an Artificial Sugar Substitute from the Hygienic Point of View—This covers a pharmacological study of this artificial sweetener from which the conclusion is drawn that Dulcitol should be prohibited as injurious to health.—W. Uglow, *Archiv. Hyg.*, 95:89, 1925.

Vitamins in Canned Foods, V. Peaches—The minimum protective dose against scurvy of raw peaches was found to be about 5 grams daily per guinea pig. The canned equivalent of 5 grams of raw peaches gave results comparable to the 5 grams of raw peaches. On a dry basis the canned peaches were about one-third as potent in vitamin A as butterfat. The vitamin B content of the peaches was so low that the large feeding required to supply it upset the general nutrition.—Edward F. Kohman, Walter H. Eddy, Victoria Carlsson, and Nellie Halliday, *J. Indus. & Eng. Chem.*, 18, 3:302, 1926.

Milk Powders as Food—II. Observations on the Existence of Vitamin E—Here is presented a nutritional study of whole and skimmed milk powders and the effect of additions of certain substances on the nutritive value of skimmed milk powders and the effect of certain diets on added cod liver oil. Skimmed milk powder diets upon which rats are sterile are so changed by the addition of water in administering cod liver oil separately that fourth generation young have been obtained. The addition of water to a highly desiccated diet may markedly influence its nutritive value.—L. T. Anderegg and V. E. Nelson, *J. Indus. & Eng. Chem.*, 18, 6:620, 1926.

Can Corrosion and Blackening in Certain Marine Products—An investigation is reported of the changes which may occur in sterile marine products. The content of sulfide sulfur is related to the blackening process which may be noted either in the corrosion of the can or in the blackening of the flesh. Those marine products which do not blacken have a low sulfide sulfur content which does not increase during storage and the sulfide sulfur content of crustacea which do blacken increases to relatively high values during storage. Products which corrode cans are more alkaline than pH 6.5. Marine products more acid than pH 6.5 never blacken and in general do not corrode the container.—D. B. Dill and P. B. Clark, *J. Indus. & Eng. Chem.*, 18, 6:560, 1926.

Solubility Experiments with Metallic Cooking Utensils—A study of the action on utensils made with various metals by 1 per cent hydrochloric acid, 5 per cent salt solution and by a solution of sugar containing 1½ per cent citric acid. As a result of these experiments, the author draws the conclusion that perhaps brass or white metal alloys are better suited for cooking utensils than tinned copper since the tinned metals more readily dissolve in the acid-sugar solution than many of the alloys.—K. K. Järvinen, *Z. Nahr. German*, 50:221, 1925.

Ought One Bleach and Artificially Mature Flour?—A critical discussion is given of methods used in the bleaching and maturing of the flour with a consideration of the changes in the flour constituents effected by the various bleaching agents. No experimental data are

given. The author summarizes the advantages and disadvantages of artificial bleaching and maturing and lays down certain principles for the regulation of bleaching, among which are label declaration of the bleaching of flour as well as label declaration on bread made from bleached flour with a further statement of the bleaching process employed.—M. Javillier, *Annal. Falsif. et Fraudes*, 204:580 (Dec.), 1925.

Presence of Rare Elements in the Food and Excretions of Man—Foods contain traces of manganese, zinc, nickel, cobalt, copper and lead.—Ragnar Berg, *Biochem. Zeit.*, 165:461, 1925.

Inactivation of Vitamin A by Rancid Fat—Feeding experiments with rancid lard on rats showed that although inferior to sweet lard as a ration component, the rancid lard does not seem to be toxic. The inferiority of rancid lard as a food product appeared to be due to its ability to destroy the vitamin A of the rations with which it was admixed. This destruction appeared to occur gradually over a period of several days and was presumably due to the oxidation of the vitamin A by the organic peroxides of the rancid lard.—W. C. Powick, *J. Agri. Res.*, 31:1017, 1925.

Hemochromatosis and Chronic Poisoning with Copper—"Evidence is slowly but steadily accumulating in favor of the view that chronic poisoning with copper causes the symptom complex known under the different names of hemochromatosis, bronze diabetes and pigment cirrhosis.

"Copper is an exceedingly useful and indispensable metal in many ways but it should not be employed where it may come in contact with foods or drinks, especially if they contain acids of any sort because it is so readily dissolved by many of them. This would exclude its use for cooking utensils of any sorts. Its use in pipes in drinking water and in hot water heaters is probably without danger."—F. B. Mallory, *Arch. Int. Med.*, 37:336, 1926. (See also *A. J. P. H.*, June, 1926, p. 653.)

Iodized Salt in the Prevention of Goiter—A report is presented of cases of hyperthyroidism among adults caused by continued use of iodized salt. The author sounds a warning against the general use of iodized salt by adults and calls attention further to the fact that community administration of iodine disregards physiological facts regarding the effect of iodine on the thyroid gland.—C. L. Hartsock, *Jour. A. M. A.*, 86, 18:1334, 1926.

CHILD HYGIENE

MERRILL E. CHAMPION, M.D.

TWO outstanding phases of hygiene challenge attention at the present moment. These are nutrition and mental hygiene. Facts about each are slowly being discovered and fitted together. Research into the underlying principles of nutrition is proving exceedingly fruitful and is having a profound influence upon child hygiene in general.

It seems worth while to stress this month some of the current material on nutrition including experimental work with which every health worker ought to have at least an intelligent acquaintance.

A Demonstration of the Community Control of Rickets—In October, 1925, the U. S. Children's Bureau undertook in New Haven, Conn., in coöperation with the Department of Pediatrics of Yale University, a 3-year demonstration which had for its main purpose the prevention or control of rickets in a city community.

The district selected had a population of about 135,000 Negroes, Italians, Irish, Polish, and Americans. A birth certificate for every baby born in the district was sent to the office and the mother was visited soon after by the nurse, and interested in the experiment. Personal visits were also made on the doctors. Children were not taken to the clinic without the consent of the family physician. Monthly examinations were made during the first year and examinations were given every 2 months during the second year. Treatment consisted

of cod liver oil and sun baths. The method of administration of both was demonstrated to each mother.

In 90 per cent of the group of babies a slight degree of rickets was found before the sixth month. So the treatment was not sufficient to prevent early manifestations. When the treatment was continued the deformities were not of a bad degree. This slight degree appeared in negro and white, breast fed and artificially fed, in the poor and the moderately well off.

Two control series of children were studied: 35 per cent of one group showed moderate or marked rickets at 30 months, and 27 per cent of the others showed the same thing at 10 months.

The demonstration is not completed so no final conclusion can be drawn, but it would seem important that cod liver oil and sun baths be given to all infants at the earliest possible age and continued regularly through the first 2 years of life.—Martha W. Eliot, M.D. From *Child Health Bulletin.*

Dietetics and Dental Hygiene—During the 10 years of educational and preventive dental service in Bridgeport, Conn., the dental hygienists were educating the grade children in dietetics. It was hoped to carry this teaching into the high school and have it include prenatal and baby feeding. A new city could be made out of any place if the girls leaving school had an intelligent idea regarding correct diet for expectant mothers and for children. Such teaching is a true part of preventive dentistry service in the schools and while it will produce fine teeth it results in fine bodies as well.—Alfred Fones, *J. Am. Dent. Assn.*, May, 1926.

The White Potato as a Source of Vitamin B—The white potato used as the sole source of vitamin B in the diet, supplies enough for practically maximum growth in the white rat when it constitutes 80 per cent of the ration. When it constitutes 40 per cent or less of the diet there is rapid nutritive failure, more or less complete according to the relative abundance of potato in the food mixture. These symptoms of malnutrition are relieved by the administration of yeast or Harris yeast vitamin. It thus appears that the white potato contains somewhat more vitamin B than is required for its own metabolism in the rat.

Measured in calories white potatoes furnish about 12 per cent of the diet of the people of northern United States. If the human requirements are of the same order as those of the rat the white potato cannot be depended on safely to make good any considerable deficiencies of vitamin B in other articles of the diet. With only 5 per cent of potato present typical polyneuritis appears almost as soon as when vitamin B is absent from the ration.—T. J. Lyman and Inez Blystone, Ohio State University, *J. Home Econ.*, Apr., 1926.

Light and the "A" Body—The author cites the cases of 2 children, brother and sister, who had xerophthalmia. An abundant supply of vitamin A food was given the girl and intramuscular injections of cod liver oil were given the boy. The condition cleared up. The children were then put on a diet deficient in vitamin A and artificial light baths were given for 2 hours a day. The condition of xerophthalmia returned. They were then given sun baths daily with no change in their condition. The author concludes that neither exposure to carbon arc light nor to sunlight will cure xerophthalmia.

Light cannot replace the A body or supply it to the animal organism. Light is indispensable to the animal organism in that the radiant energy of ultra-violet light is essential to various functions. This energy is absorbed by the organism partly by direct radiation and partly through articles of diet (that is cod liver oil, yolk of eggs, and to some extent, milk) which are charged with it.—C. E. Block, Copenhagen, *Am. J. Dis. Child.*, Mar., 1926.

Ten Years of Vitamin Research—Long before vitamins became accredited dietary essentials their coming was foreshadowed. Before the term vitamin was even suggested, the existence of an antineuritic substance as something different from the then known foodstuffs but essential to normal nutrition was clearly voiced by the Dutch physician Eyjkman. However, December, 1911, when Casimer Funk proposed the term "beriberi vitamins" may be taken as marking the end of uncertainty as to the chemical reality of this kind of factor in nutrition.

A fat soluble growth promoting vitamin was also discovered by McCollum and Osborne and Mendel in 1913 now called vitamins. During the 5-year period, 1915–1920, our knowledge of the occurrence of both vitamin A and vitamin B was extended in a qualitative and also in a rather crudely quantitative way. The almost inevitable occurrence of xerophthalmia upon withholding vitamin A and the absence of such

an effect on withholding vitamins B and C was demonstrated.

By 1920 we find three vitamins "officially" recognized and their physiological properties defined:

1. *Vitamin A*—essential not only for growth but for health and vigor at all ages; its absence leading to weakness or abnormality, not only to tissues of the eye, but also in other parts of the body especially the lungs.

2. *Vitamin B*—growth-promoting and neuritis-preventing, essential to normal nutrition at all ages. A partial but not complete deficiency leads to impaired growth and a general undermining of health and vigor, with increased susceptibility to infectious disease and interference with normal reproduction.

3. *Vitamin C*—a dietary asset even to a species which shows no scorbutic symptoms, such as the white rat; to be liberally used as a preventive of "latent" scurvy, a condition in which resistance to infectious disease is reduced and in infants, more or less retarded growth and especially interference with the normal growth and calcification of the teeth result.—Mary Schwartz Rose, *J. Home Econ.*, May, 1926.

The Newer Nutrition—To quote from Dr. Mendel's *Chemistry of Life:*

"Notwithstanding the great advances which recent years have witnessed in the science of nutrition almost innumerable problems still confront the critical investigator. The fundamental chemistry of the nutritive processes is scarcely understood in a single detail. Although the significance of 'the little things' in nutrition is becoming better appreciated their function is by no means completely explained. Instinct is not always an unerring guide in the selection of food, although it may lead along the paths of nutritive safety under the unhampered conditions of nature. It has been found undependable in more than one instance where the food choices of the highly artificial civilized worlds are concerned. In any event the history of science should warn us against the dangers of dogmatism, in the presence of so much that remains unknown or unexplained. Particularly when science and experience seem to conflict it is well to keep an open mind. The science of nutrition is in the midst of a continual evolution of facts and development of truth. For the present, therefore, we should first get the facts."

In reviewing the literature for the past year one realizes how many people are trying to "get the facts." An outstanding piece of experimental work which has been reported is that done on the deficiency disease of infancy, rickets. Three factors are recognized as playing an important part in the prevention of this, namely, adequate calcium and phosphorus, the antirachitic vitamin, and radiant energy. Whether 1 or all 3 are necessary is still a debatable question. The theory that the sign of rickets in a child reaches back into its prenatal life has been considered, discarded and reconsidered. Recent investigations indicate that a defective diet taken by a pregnant woman predisposes her baby to rickets.

Interest in the existence of a new vitamin, the so-called fat soluble E, and its relation to fertility and reproduction have occupied many of the research workers.

In infant feeding there has been a marked change within the last few years, with greater emphasis upon the importance of breast feeding, more concentrated food and the addition of solid food earlier in the diet, in order to meet better the nutritive needs of the infant.

Advance in the knowledge of animal nutrition has been much more rapid than in that of human nutrition; nevertheless, although the knowledge of human nutrition is still in its infancy great advances are being made.—Lou Lombard, Boston, Mass.

Children That Eat Poorly—Of the 3, 4 and 5-year old children reported as refusing to take proper nourishment, a certain proportion may be disregarded, because they are expected to eat beyond their needs and naturally rebel. With the others the trouble often begins when soft foods are first given. Children of this type usually reject the sweet foods and prefer the highly seasoned. Engel calls it early maturing of taste. The neuropathic nature of the condition is undoubted. Other signs of psychopathy are frequently seen. Generally, it is the only child who is affected. That these children often still have the bottle, probably morning and night, shows the faulty attitude of the parents. Training is foremost in treatment. A change is helpful. Children who at home refuse even fine food may eat readily elsewhere. The bottle should be forbidden at once. The food must be planned to appeal to the child's appetite without endangering his digestive organs. It is a mistake, he says, to force on these children, with nervous and mental instability, food which they dislike.—*Monatschr. f. Kinderh.*, Leipzig, June-July, 1926; *Arch. Pediat.*

The **Prevention of Rickets**—(Summary).

1. A study of infants, aged from 1 to 3 months, born in the spring and summer of 1924, receiving graduated doses of ½ to 1½ teaspoonfuls of a biologically tested cod liver oil, revealed the development of clinical rickets in 91 per cent of the subjects.

2. A more intensive study of 47 infants, age from 2 weeks on, born in the winter of 1925, receiving daily doses of 1, 2 and 3 teaspoonfuls of biologically tested cod liver oil, showed the development of clinical rickets in 69 per cent of the cases, as compared with 76 per cent of the control series of 30 cases.

3. Ninety-seven per cent of infants born in the summer, and 91 per cent of infants born in the winter who received cod liver oil showed roentgenographic evidence of rickets.

4. Ninety-seven per cent of the infants born in the summer, and 98 per cent of infants born in the winter who did not receive cod liver oil, showed roentgenographic evidence of rickets.

5. Rickets was observed earlier by Roentgen rays than by clinical examination, being observed in 4 per cent at 1 month and in 23 per cent at 2 months of age, compared with a total of 4 per cent at 2 months by clinical examination alone.

6. By the fourth month, rickets was present in the majority of infants of both groups.

7. The early age incidence of the development of rickets observed, indicates the necessity for measures of prevention or control to be instituted in the first month, particularly for babies born in winter.

8. The correlation of the clinical and roentgenographic evidence of rickets observed at the various age periods in this investigation indicated that active rickets is encountered most frequently in the first 6 months of life, and healing rickets after 6 months.

9. There did not seem to be any relation between the degree of rickets observed and the amount of cod liver oil received.

10. The concentration of calcium and inorganic phosphorus in the serum of infants under 5 months of age, with early clinical and roentgenographic evidence of rickets, was found to be within the normal range.

11. A comparison of the degree and incidence of rickets observed in infants receiving and not receiving cod liver oil did not reveal any striking difference.

12. Infants receiving cod liver oil showed rickets that healed earlier than that of the control series.

13. The nature of the relation of cod liver oil therapy to the development of rickets, as observed in these studies, would seem to be one of control rather than of prevention.—Mary G. Wilson, *Am. J. Dis. Child*, May, 1926, p. 603.

Glucose and Insulin in the Treatment of the Vomiting of Pregnancy—The cause of nausea and vomiting of early pregnancy has not been solved but it is no doubt due to deficiency of carbohydrate needed by the developing embryo. A carbohydrate rich diet is necessary to avoid depleting glycogen in the maternal liver. Such a depletion leads to a fatty degeneration if diet is not corrected. Acidosis and food intolerance develop so that the mother feeds on her own tissues.

Intravenous glucose therapy employed from early pregnancy has decided value. The use of insulin with glucose was found preferable for more prompt relief. Severely toxic patients who do not show prompt improvement have recourse only to therapeutic abortion.—E. L. King, M.D., New Orleans, La.

Nephritis and Nutrition—The treatment for nephritis with regard to diet has usually been an effort to "rest the kidneys." However, the implication that the kidneys are the only, or at least the foremost parts of the body involved cannot be regarded as demonstrated; furthermore it is by no means clear to-day how a "rest" can be secured for the kidneys. Starvation will not serve because when food is not consumed the body lives on itself. The principal function of the kidney is to excrete the ashes of food and the ash from muscle protein is exceedingly irritating to the kidney. Fat and carbohydrate ash are eliminated through the lungs but a diet of these is not sufficient since the body must daily have some fresh protein with which to repair its worn protoplasm. Milk has had the greatest vogue as a food that meets most nearly the requirements of the diseased kidney, yet the conventional quart a day does not furnish enough fuel value, 3 or 4 times as much as this being needed.

A return of the theory that high protein is bad has resulted in prescribing low protein diets, but this should not be carried to the extreme. The nitrogen balance and the level of non-protein nitrogen are only indirectly dependent on the amount of protein in the diet and are only partly determined by the functional state of the kidney. Increasing dietary protein can be expected to raise the non-protein nitrogen of the

blood only if it raises the protein metabolism of the body. When such an increase contributes only to the restoration of depleted body tissue it has no such effect.

The nephritic patient needs adequate nutrition. The day for "depleting" nephritic patients over long periods of time seems to have passed.

The kidneys should no longer remain the sole center of interest in nephritis as far as treatment and diet are concerned.—*Jour. A. M. A.*, May 22, 1926.

The Nutritional Requirements of Nursing Mothers—Summary and Conclusions (The author describes results in rat feeding experiments):

1. Rickets is primarily due to a lack of the antirachitic vitamin, and will develop when a lack of the vitamin is the only deficiency in an otherwise adequate diet.

2. The diet of the mother is an important factor in increasing or decreasing the resistance of the young to the effects of diets which are deficient in the antirachitic vitamin.

3. Under ordinary circumstances rickets does not develop in the young of well nourished mothers when a lack of the antirachitic vitamin is the only deficiency in their diet.

4. The rapidity with which the disease develops and the severity of the lesions depend upon the degree to which the mother's reserve of the antirachitic vitamin has been depleted.

5. After the mother's vitamin reserve has been depleted until the young are made very susceptible to rickets, she can be brought back to normal by increasing the vitamin content of her diet.

6. The diet of the mother can be made to furnish enough vitamin to prevent the depletion of her reserve of this factor, and allow her to raise fourth litters that are normal in resistance.—Agnes H. Grant, *Am. J. Hyg.*, Mar., 1926.

Lead Poisoning in Nursing Infants—In nursing infants lead poisoning is probably too seldom considered as a diagnostic possibility when such common symptoms as vomiting, general nervousness and anemia constitute the clinical picture. The history of a source of lead, basophilic degeneration of the red blood cells, the changes in the spinal fluid and the chemical detection of lead in the excreta were the most valuable aids and the final proofs in the diagnosis of lead poisoning, in the cases studied. The presence of lead in the feces of the 2 patients studied demonstrates that lead in appreciable quantities may be ingested by infants suckling breasts which have been exposed to lead shields. The detection of lead in the urine of case 2 is absolute evidence that after ingestion lead can be absorbed into the blood stream and in the cases studied in sufficient amounts to affect the blood and to cause changes in the spinal fluid.

The findings warrant the conclusion that lead poisoning in both patients was caused by the use of lead nipple shields, since neither infant was fed from nursing bottles nor were lotions or ointments used on the breasts in conjunction with the breast shields.

If care is used in washing the nipples previous to each nursing when lead nipple shields are used there probably will be no intoxication of the nurslings. The duration of the use of the shield should be less than 1 month.—Herbert B. Wilcox and John P. Caffey, New York, *Jour. A. M. A.*, May 15, 1926.

Iodized Salt in the Prevention of Goiter—A statistical study of cases of hyperthyroidism in a Cleveland clinic showed that a large number of the patients had used iodine in some form. Iodized salt is now being used more extensively by the public than other forms of iodine, due to the propaganda to insure its use and because of the fact that when one member of a family is advised to use it the whole family must—as its use in cooking is always advised.

There has been a great incidence of hyperthyroidism since the use of iodized salt has been in vogue and the onset of the symptoms have followed shortly after the initial use of the salt. Five cases of severe hyperthyroidism in girls from 12 to 18 years were seen and in all cases the hyperthyroidism developed after the use of iodized salt was begun. This was rather unusual as it has been considered possible to give iodine almost ad libitum at this age.

Continuous use of iodine over a long period of time should never be prescribed for adults and the use of iodized salt in particular should be discontinued or limited to periodic table use by children under the age of puberty. C. L. Hartsock, Cleveland, O., *Jour. A. M. A.*, May 1, 1926.

EDUCATION AND PUBLICITY

EVART G. ROUTZAHN *

Why Join the Education and Publicity Section?—Because it is the one professional body of men and women doing health education and publicity. Because the whole movement for popular health education is the stronger for the professional recognition of those who are doing the work. Because the Section on Health Education and Publicity gains strength and courage with the larger enrollment of those who should be sharing in its responsibilities and its advantages. *Because every worker has something to share with others doing the same kind of work.* And because *every one who has not fossilized on the job can learn from his fellow workers.*

Popular Health Instruction in Illinois—What is the present status of popular health instruction as revealed by the new appraisal scoring system? A picture of conditions as they are is provided in the recent appraisal of the public health services in 15 Illinois cities with populations ranging from 30,000 to 100,000, as reported in *Illinois Health News*, Springfield, for May–June, 1926. The introductory summary includes the following paragraph:

"Popular health instruction is the most neglected public health activity in these cities, the average score being only 29 per cent. With the better organization of health departments, more attention should be given to organized efforts of popular health instruction. A statewide plan of health education adopted by the State Medical Society should be intensively developed in these and other communities."

The tale of the 15 cities is recorded in the comments and individual scores as compared with the 20 points of the standard score for "Popular Health Instruction: Use of pamphlets, bulletins, press lectures and moving pictures," as follows:

Aurora, 4 points. "The health officer has done a considerable amount of educational work, but the department has published no health bulletins and no moving pictures were shown."

Bloomington, 2 points. "Very little health education work is being done in the city except in the schools and by the Day Nursery Association."

Cicero, 2 points. "Very little health education work is carried out except through the visits of the nurses."

Danville, 4 points. (No comment.)

Decatur, 13 points. "A considerable amount of health educational work was carried out last year. Although no periodical health bulletins were printed by the health department, monthly summaries of health activities conducted by all agencies in the city were assembled by the health papers, medical professions, etc."

East St. Louis, 5 points. "Motion picture films are used rather more extensively than in most cities of the group, and pamphlets obtained from outside sources are generally distributed on special occasion. There are, however, no bulletins or pamphlets printed locally, neither is the press utilized systematically for definite public instruction. News items relating to general health conditions are given to the paper frequently, but they usually carry little or no instructive value."

Evanston, 9 points. "Although a considerable amount of education work has been carried on in Evanston, this could be extended to advantage, especially by the publication of periodic health bulletins and the distribution of educational health pamphlets to cases of contagion."

Joliet, 2 points. (No comment.)

Moline, 3 points. "Very little in the way of popular health education has been attempted. The publication of bulletins and reports for general circulation and the distribution of special pamphlets to quarantined families could be undertaken with profit."

Oak Park, 10 points. "No health bulletins are published by the health department, although the health officer publishes in the local newspaper weekly bulletins of all contagious diseases and other public health problems. Lectures were made by local physicians on goiter

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York City.

prevention and by the health commissioner on many health topics."

Peoria, 3 points. "Health education in the city, except that in the schools, is not well organized."

Quincy, 3 points. "Full advantage was not taken last year of the multiple opportunities for reaching the public with preventive medical instruction. This is generally one of the most neglected phases of public health service."

Rockford, 17 points. "A considerable amount of popular health instruction has been carried out by the health department and other agencies. A monthly bulletin is published by the health department; educational health pamphlets are freely distributed; systematic newspaper publicity is carried out; many lectures are given on public health and motion pictures on health were shown to 13,000 people in theaters and to all students in seven schools."

Rock Island, 0 points. "Very little in the way of popular health education has been attempted."

Springfield, 10 points. "In popular health instruction, Springfield's score was reduced by a lack of weekly and monthly bulletins and the failure to show motion pictures on health."

The final summary and recommendations carry the following paragraphs:

"Popular health instruction embraces a group of activities difficult to measure by objective methods such as are used in the *Standard Appraisal Form*. The items considered are distribution of health literature, publication of weekly or monthly health bulletins, systematic newspaper publicity of which a record is kept, principal lectures on public health and by whom given and use of motion pictures on health. Rockford stands first among these cities, chiefly because it is the only city in which the health department publishes monthly and annual reports through a health bulletin. Next come Decatur, Springfield, Oak Park and Evanston in order.

"Owing to the difficulty of measuring this work by objective standards, the popular health instruction carried out in the other cities attains low ratings. The health departments in these cities are not making full use of the possibilities of educating the people. Generally speaking, purely educational service is the most neglected aspect of health work in the 15 cities surveyed.

"Of course 'education' is inseparably linked with almost every function of a public health department which might almost be called an educational institution. At the same time there is a narrow field that may very properly be termed 'health education' in a selective sense and which can be utilized to advantage.

"Annual reports, for example, can be made to carry a popular message in an interesting way. Wide distribution of such a publication certainly stimulates popular support in public health activities. Periodic bulletins on seasonable subjects are valuable as a means of public contact.

"An attractive birth certificate to the parents of each new-born child promotes completeness of registration. It also provides an opportunity for selective distribution of special literature on infant care and feeding.

"Health playlets and motion picture films are especially serviceable in public schools and produce splendid results when intelligently utilized.

"Occasional lectures before selected audiences such as civic clubs, chambers of commerce, women's clubs, etc., are without equals for creating and maintaining public interest and support of perennial programs.

"The organization of study groups, especially of mothers, is popular and productive of most satisfactory results. Such groups are willing to undertake courses relating to children that involve biweekly meetings during the scholastic season.

"Newspapers offer a splendid opportunity for spreading emergency information rapidly and effectively. Special programs like vaccination campaigns against smallpox and diphtheria make 'news' that papers like to utilize to the advantage of all concerned.

"These points suggest some of the manifold ways of reaching the public with scientific information of benefit to health and welfare."

Is this a true and fair picture for the 15 cities?

Is it a fairly true picture for city department work throughout the country?

Does the appraisal form satisfactorily provide for a reasonably accurate scoring of popular health instruction?

The editor would welcome discussion of these questions in advance of the consideration to be given to them by the Education and Publicity Section at Buffalo in October.

LISTS

Directory of Whole-time County Health Officers, 1926. *Public Health Reports*. U. S. P. H. S., Washington. April 16, 1926.

DATES AHEAD—JULY

1—Dominion Day (Canada)

4—Independence Day

4—150th anniversary of the signing of the Declaration of Independence

4—100th anniversary of birth of Stephen C. Foster, author of "My Old Kentucky Home," "Old Black Joe," and "Way Down Upon the Suwanee River."

14—Bastile Day

15—St. Swithin's Day

The recent celebration of the silver jubilee year of the tuberculosis movement in Ohio and the 21st anniversary of the Tuberculosis Society of Detroit and Wayne County are reminders that we are in the midst of an anniversary period which should be taken advantage of by health agencies. Many an annual meeting, this year or later, may well be an anniversary occasion. Even with little variation in program details the announcement of an anniversary sounds much less deadly and uninviting than an annual meeting.

PLAYS

How Knowledge Driveth Away Fear, by Albert W. Whitney. *National Safety News*, 108 East Ohio St., Chicago: 13:19–20, Mar., 1926.

Madame Santé's Fashion Show, by Del Rose Mecan. *Bull., Nat. Tub. Asso.*, 370 Seventh Ave., New York, May, 1926. Free. For high school girls. Based on "Fashion Plates," issued by the same organization.

The Trial of Fire. *Red Cross Junior*, Toronto, Apr., 1926. Fire prevention in the home.

The Trial of Jimmy Germ, by Katherine Howard. *Hygeia*, Mar., 1926.

SCHOOLS AND CHILDREN

Four Year Trial Proves Value of Child Health Car. *Nation's Health*, 8:336–337, May, 1926. Public health significance of the Wisconsin "child welfare special."

Health Training in North Carolina, by L. B. McBrayer and Theresa Dansdill. *Hygeia*, June, 1926. 6 illus. Price, 25 cents. Incidents illustrating health activities among children.

Little Mothers' Leagues, by H. E. Kleinschmidt. *J. Soc. Hyg.*, Mar., 1926. Their significance as a method.

Richland County, Ohio, Improves the School Child's Health. *Nation's Health*, Mar., 1926. 5 illus.

MOTION PICTURES

Christmas seal trailer for 1926—Tells the story of old King Cole and his fiddlers three. The king is out of sorts. In order to cheer him up and improve his health the three fiddlers suggest that he enjoy himself in the fresh air. Accompanied by his pet goose he follows them outdoors. There they show him the gymnastics at which they are experts, and the king, somewhat awkwardly, but nevertheless effectively, copies them until his spirits are revived and he feels once more like a "merry old soul."

"A one reel motion picture film, entitled 'Paying the Price,' prepared by the Travelers' Insurance Company, is now available for loan in New York State. The picture is especially adapted for factory and industrial use and tells in simple form the importance of prompt and careful first aid work.

"In brief the story of the film is as follows: A mechanic who injures his hand slightly wraps a rag around it and goes on with his work. The hand gets sore. The mechanic dreams that he loses his arm and sees a vision of himself as a 'one-arm man' facing life's battles and problems. He is much relieved to awaken and find that it is all a dream, but he had learned his lesson, and goes at once for proper medical treatment. The picture is entirely free from gruesome details and is excellent for its purpose."—*Health News*, Albany, N. Y., May 17, 1926.

The Story of Mother Wise. Massachusetts Department of Health. "The unfortunate results on the child's behavior of overindulgence by the parents, of improper food, of irregular and unhygienic habits are shown in the first part of the film. How to bring up children without letting faulty food habits get started, with temper tantrums a rare occurrence, and with regular habits and happy dispositions is told by Mother Wise in the second part and exemplified by her six healthy normal little youngsters."—*Bull.*, Boston Council of Social Agencies. Booklets of the same title are distributed after each showing of the picture.

RADIO

A Few Hints for Broadcast Artists, issued by WEAF. Free. Broadcasting Company of America, 195 Broadway, New York.

Dirty Streets and Health, by B. R. Rickards, State Dept. of Health, Albany. Good for broadcasting or for publication in the spring.

The Youth of Today, by Newell W. Edson. *J. Soc. Hyg.*, Apr., 1926. Social hygiene via radio.

TITLES

"Bootleg Thermometers — Exploiting the Public." *Conn. State Dept. Health.*

"Postponing Our Own Funerals." *Hygeia*, June, 1926.

"Six Glands and Thirty-two Teeth"—how six glands regulate mouth health and general health. *Popular Health Mag.*, Minneapolis, June, 1926. 10 cents.

"Your baby's biggest job—learning to handle a grown-up diet." Advertisement in *Hygeia*, June, 1926.

SLOGANS

"Don't Swat the Mosquito—Prevent His Breeding." Press release, Detroit Department of Health.

"Every Doctor a Health Officer in His Own Field"—George E. Vincent, Rockefeller Foundation.

A "poster slogan contest" was a feature of Child Health Day in Rochester. "The winning slogans in each of the divisions were as follows: 'Save on Sweets—Invest More in Health'; 'There was an old woman who lived in a shoe—Her children were so thin but she knew just what to do. She fed them on a quart of milk each day and they became healthy without delay'; 'Fruit—Nature's Wealth is Health'; 'To keep well and fair—Breathe Plenty of Fresh Air.' The second prize slogans were: 'We have our handkerchiefs and we use them'; 'Fresh Air for Health'; 'Here are the Essentials for Good Health—Fresh Air, Exercise, Cleanliness, Clean Teeth, Daily Baths, Vegetables, Milk.'"—*Bull., Tub. and Pub. Health Assoc.*, Rochester, N. Y., Apr., 1926.

"Pictures of Health with Birth Registration Certificate"—"This booklet is an effort to put health information, written in simple terms, into the home promptly after the birth of a baby. It is delivered, of course, by health department nurses. Racine and Madison, Wis., are using it. The idea of pictures of the baby, with weight and height records, is borrowed from the ordinary baby book. The certificate of birth registration and the smallpox and diphtheria certificates are incorporated with the other information in the hope that they, as well as the pictures and records of the baby, will make the booklet worth keeping, and thus give the other information a chance to 'percolate' more or less painlessly."

Samples free, W. W. Bauer, M.D., 1216 Blaine Ave., Racine, Wis. Special quantity rates.

Specialization at Buffalo in October—What do you wish to tell about? What do you wish to learn about? The Council of the Education and Publicity Section of the A.P.H.A. would welcome replies to those two questions from everyone doing any phase of health education or publicity, or concerned with the direction or supervision of such work.

Through a series of round tables, limited to 25 in attendance at each one, and an arrangement of interviews with specialists, there will be abundant opportunity for conference on the subjects you are most interested in at this time. Kindly write to the chairman, Raymond S. Patterson, care of State Department of Health, Trenton, N. J., or the secretary, E. G. Routzahn, at 130 East 22d Street, New York, or any member of the Section Council.

Incidentally, all fellows and members of the A.P.H.A. are very cordially invited to affiliate themselves with the Education and Publicity Section if they are interested in that phase of the work.

MSR Wm P S Re R—These initials penciled at the top of this issue of the JOURNAL will carry the magazine through the round of the desks where the occupants are more or less interested in education and publicity. Of course it will simplify matters to all "pages 763 to 767," thus indicating the pages covered by the Education and Publicity department in this particular issue. We may go further and pencil a specific page number after one of the initials to call attention to a page carrying an item of particular interest to that individual. Public health workers are such busy folk that we need to use devices and strategems to get them to read professional material! They are so much like other people!

Buffalo, October, 1926—More workers in health publicity and education are expected at the Buffalo meeting of the A. P. H. A. than at any previous convention. Nothing else can take the place of conference with fellow workers in getting new viewpoints, gaining fresh enthusiasm, finding answers to questions, and learning possible solutions of perplexities. Buffalo will provide such opportunities during every hour of the day.

Free Material—In most cases requests for copies of "free" material should be accompanied by return postage, or better, enclose with each request an addressed and stamped envelope.

POPULAR HEALTH ARTICLES

Completing the Sale. *Saturday Evening Post*, Mar. 13, 1926. Editorial on making use of health examinations.

Mary Ann Takes a Beauty Course, by Grace N. Jernigan. *J. Outdoor Life*, May, 1926.

The Too-Too-Thins, by Lulu Hunt Peters, author of Diet and Health. *J. Outdoor Life*, Mar., 1926.

Vittles and Vitality, by Lulu Hunt Peters. *Colliers*, June 12, 1926. Tells what to eat and why.

Your Eyes—Their Care and the Prevention of Accidents and Injuries to Them, by F. Park Lewis. *New York Central Lines Magazine*, 466 Lexington Ave., New York. Free. A series of articles. Some of your employes' house organs may care to reprint the series.

Most of the articles listed under this heading from month to month contain material good for educational uses.

SLIDES AND FILM SLIDES

"A set of ten mica lantern slides carrying simple slogans on diphtheria prevention has recently been prepared by the N. Y. State Dept. Health, Albany.

"The United States Public Health Service has recently announced the release of strip film views illustrating lesions of syphilis and of skin diseases simulating syphilis. The preparation of these pictorial studies in such convenient and serviceable form was made possible through the courtesy of a number of eminent syphilologists and dermatologists whose private collections of photographs were used in making the strip film pictures. The views are taken from both acquired and congenital cases. They depict not only the usual genital and extra-genital lesions but a number of rare and unusual views are also shown. . . . These films are not for sale, but are released to state boards of health for extended periods."—*J. Social Hyg.*, Feb., 1926.

Annual Reports—Lacking either or both a table of contents or index are most of the departmental reports received by the editor. This makes it quite a chore to locate any specific subject in the reports.

"Unroll it if you can" seems to be the challenge of one official report for 1925 which successfully resisted several efforts to get the pages flat for easy reading. I wonder how libraries file such a quarter-circle volume.

Eighth Annual Report, Division of Social Hygiene, New York State Department of Health for 1925. Valuable for detailed description of educational activities and brief discussion of some of the educational problems.

LAW AND LEGISLATION

JAMES A. TOBEY, LL.B.

Health Bills Before Congress—By the time this material appears, the first session of the Sixty-ninth Congress will undoubtedly have adjourned, as it was planned to bring the session to an end the middle or latter part of June. A summary of the meager action or lack of it, which has been taken on health measures will, therefore, be given in the next issue of the JOURNAL.

Since our last report, there has been very little progress on any matters of interest to sanitarians, though a few hearings of significance have been held. An act granting retirement to members of the Army and Navy nurse corps has been signed by the President.

Hearings on the bills (S. 4126, H.R. 11768) to prohibit the importation of milk and cream into the United States unless the shipper has a permit from the Department of Agriculture and complies with certain sanitary requirements, were held for several days up to May 22. Various persons, including Senator Copeland, former health commissioner of New York City, urged the adoption of the measure, while representatives of Canadian and New England dairy interests opposed the bill in whole or in part.

Hearings were also held on the bills (S. 3983, H.R. 11886) to establish a division of safety in the Bureau of Labor Statistics. Dr. L. R. Thompson of the Public Health Service and Dr. R. R. Sayers, Chief Surgeon of the Bureau of Mines, raised the question as to whether the proposed division would not duplicate the industrial hygiene work already under way in their

respective bureaus. Dr. Ethelbert Stewart of the Bureau of Labor Statistics and Mr. Rathbone, author of the House bill, assured the committee that it was proposed only to assemble data on industrial accidents and information not now officially collected, and that no duplication would be allowed to take place. Mr. Rathbone has introduced a new measure (H.R. 12263) which expressly stipulates that there shall be no duplication.

Persons who give blood for blood transfusions would be compensated, whether they are in the government service or not, according to the terms of S. 4367, introduced by Senator Wadsworth. The Comptroller General recently ruled that government funds could not now be used for this purpose, even in government hospitals.

The Maternity and Infancy Act—The bill (H.R. 7555) to extend the operation of the Federal Maternity and Infancy Act for an additional 2 years, which passed the House on April 5, came up in the Senate on May 18. At the request of Senator King, the bill was passed over, however, to resume its place on the calendar for future consideration.

The American Medical Association *Bulletin* for May, 1926, contains an interesting 8-page article by Dr. W. C. Woodward on the Sheppard-Towner Act. After outlining the present status of the law and the bills in Congress to continue the act, Dr. Woodward proceeds to develop eight arguments in opposition to the Sheppard-Towner plan. In the first place, he questions the accuracy of statistics showing that infant and maternal mortality in the United States is excessive as compared with the rates in other countries, but says that even if it is higher, the conclusion is not justified that such mortality can be reduced by legislative action, nor that the needful legislation could be enacted more effectively by the federal government than by the states. The next contention of Dr. Woodward is that the Sheppard-Towner Act fails to consider the relative importance of state health activities and so tends artificially to unbalance the health program. The distribution of money appropriated under authority of the act is arbitrary and irrational, according to the writer, and the subsidies do not necessarily accomplish the increase of state appropriations for child welfare, but may merely cause a reallocation of state funds. The extent to which the Sheppard-Towner Act produces increases or decreases in maternal and infant mortality is stated not to be determinable by a study of mortality rates alone. Maternal and infant health work cannot be separated from health work generally and in order to prevent wasteful duplication, the federal government must ultimately gain control over all other health activities. The Sheppard-Towner Act is furthermore alleged to involve a wasteful and unwise duplication of effort in federal health activities, because this work, which is said to be primarily medical, is supervised by a "lay" bureau. Finally, Dr. Woodward says that if the subsidization of health care of mothers and babies is justified, persons of all other ages should also be cared for by the federal government.

Dr. Woodward writes in conclusion that his comments have been offered in the hope of bringing about a clearer understanding of the purposes and probable effects of the Sheppard-Towner Act. If he would give some specific examples, the object might be nearer achievement. For instance, he might enlighten his readers as to exactly how reduction of infant and maternal mortality is to be brought about, or he might cite some specific examples of reallocation of state funds for the purpose of securing federal subsidies. As it is, this *ex parte* statement is, to a neutral observer, not convincing.

At the National Conference of Social Work, held late in May in Cleveland, Dr. Richard A. Bolt read a paper on federal subsidies. The National League of Women Voters, Washington, D. C., has recently issued a pamphlet on Federal Aid to the States. These two papers might well be read with Dr. Woodward's article in order to get both sides of this important matter.

State Health Officers' Meeting—The Conference of State and Provincial Health Authorities of North America held their annual conference with the Public Health Service on May 24-25. Many subjects were considered, including: a registration area for morbidity reports; sanitary control of shellfish; the education of sanitarians; plague; smallpox; rabies; scarlet fever; leprosy; the sanitation of garages and the use of tetraethyl lead in gasoline; county health work; the research of the Public Health Service; and milk standards. The proceedings of the conference will be issued later, when the Government Printing Office gets around to it.

Of particular interest from the standpoint of legislation was a resolution endorsing a uni-

form milk standard for the United States. As reported in the *United States Daily*, the proper criteria for an effective standard milk ordinance has the following essentials:

a. It must be designed to effect the maximum percentage of pasteurization which each city will support.

b. It must improve as rapidly and as much as possible the quality of any portion of the milk before pasteurization.

c. It must improve as rapidly as possible the quality of any portion of the milk which remains unpasteurized.

d. It must encourage greater milk consumption.

e. It must elicit the coöperation of the dairy industry.

f. It must be so framed as to be likely to be enacted by both small and large cities, cities with little or no previous milk control, and cities with long experience in milk control, cities with a majority sentiment in favor of pasteurization, and cities with a majority sentiment opposed to pasteurization.

g. It must be so designed as not to exclude the many cities which cannot be induced to enact a universal pasteurization ordinance and the many cities which cannot be induced to enact an ordinance which limits the sale of milk to the highest ideal grade.

Vaccination Upheld in Kentucky—The rules of the State Board of Health of Kentucky requiring vaccination as a prerequisite to school attendance were upheld by a verbal decision of the State Court of Appeals on March 20. A temporary injunction to enjoin a local board of health from enforcing the rule was denied by the court, which on several previous occasions has upheld vaccination. The leading cases are Highland Park School District vs. McMurtry, 169 Ky. 457, and Hill vs. Bickers, 171 Ky. 703, both decided in 1916. These cases were followed in 1922 in Andes vs. Shaw.

New Health Legislation in New York—The year 1926 has been a most satisfactory one from the standpoint of health legislation in New York, according to *Health News* for May 17, 1926. The new laws include, besides an effective medical practice act, the following:

Chapter 277 appropriated $59,387.98 to cover grants of state aid to counties.

Chapter 185 added to the Public Health Law a new section 25-a, providing for the control of dogs when rabies prevails, and repealed section 90 of the Farms and Markets Law. The measure was endorsed by the Commissioner of Farms and Markets.

Chapter 308 amends the Public Health Law increasing the compensation of local health officers, legalizing the appointment of acting health officers to serve in the temporary absence from duty of regularly appointed health officers, and authorizing boards of health to provide additional compensation to health officers for taking release cultures in diphtheria. The bill, identical with that introduced last year at the request of the department, was introduced this year at the request of the State Sanitary Officers' Association.

Chapter 309 authorized the State Department of Health to make rules and regulations for the protection of the water supplies of state institutions and United States reservations. The measure was endorsed by the president of the State Hospital Commission.

Chapter 319 made an appropriation for construction of new buildings at the State Laboratory.

Chapter 367 amends section 19-b of the Public Health Law relating to state aid to counties, making it more explicit and workable.

Chapter 499 amends the Public Health Law to provide that a county health unit may be abolished by the board of supervisors after two years, after a public hearing.

Chapter 635 amends the Domestic Relations Law to expedite the reporting of marriages.

Chapter 723 provides for the sale of the old Yates Street laboratory property, the proceeds to be applied to purchase of land adjoining the present state laboratory property.

Other Court Decisions—The United States Supreme Court recently affirmed a decision of the Supreme Court of Missouri upholding the revocation of a physician's license by the State Board of Health (State ex rel. Hurwitz vs. North et al.). The license was revoked on account of performance of an illegal operation.

The United States Circuit Court of Appeals for the Second District has upheld the decision of the District Court for the Eastern District of New York sustaining the validity of the Ornstein patent for chlorination of water, held by the Electro Bleaching Gas Company and used as licensee by Wallace & Tiernan.

In Montana it has been held in Pue vs. Lewis and Clark County, 243 Pac. 573, that a county is not liable for sanitary work under contract made by a health officer without authority.

In Oklahoma a city was held liable for injury to a dairy business caused by the pollution of a stream by the city's sewage. City of Collinsville vs. Brickey, 242 Pac. 249.

The rules of a city board of education for the prevention of communicable diseases in schools have been upheld in Minnesota in Stone vs. Probst et al., 206 N. W. 642. The case was brought by the parent, a Christian Scientist whose daughter was excluded from school on account of sore throat and refused readmittance until a culture showed freedom from infection. The lower court refused to grant mandamus to compel her admission and this action was upheld on appeal as reasonable and proper.—Abst. *Pub. Health Rep.*, May 7, 1926.

A district health officer in Florida has been sued for vaccinating children without the consent of the parents. Unless the existence of an immediate emergency can be shown to justify this action, the health officer may have difficulty in his defense of this procedure. He should be careful about indiscriminate vaccination, because quarantine is an effective legal substitute where permission to vaccinate is withheld.

Miscellaneous Items—An excellent statement of public health law, with special reference to Illinois, appears in the *Nation's Health* for May, 1926, in an article by Henry P. Chandler entitled "Health Officers in Chicago Region Have Defined Powers."

The *Boston Medical and Surgical Journal*, one of the two weekly medical journals issued in this country, is carrying in every second number a column entitled, "Notes from the National Capitol," which outlines matters of interest to physicians before Congress, the executive departments, and the United States Supreme Court.

The United States Bureau of Animal Industry reports that tuberculosis in cattle seems to be on the decline. A survey completed on May 1, 1926, with results from over 10,000,000 tests reveals a reduction in the prevalence of the disease from 4 per cent in 1922 to 2.8 per cent in 1926.

The United States Bureau of Labor Statistics has recently completed a study of the effects of radium on workers.

The Public Health Service announces that the League of Nations, with the coöperation of the Rockefeller Foundation, will send a commission to the Mississippi Basin to study methods of malaria control.

The States Relations Committee of the National Research Council held a meeting in Washington, D. C., on May 27 at which Dr. Ennion G. Williams presented a paper on the possibilities of research in public health.

The reorganization of the National Health Service of Chile is described in *Public Health Reports* for April 30, 1926, by Dr. Lucas Sierra, Director General of Health.

CONVENTIONS

July 20–23, Associated Anesthetists of the United States and Canada, Nottingham, England.

August 23–27, National Medical Association, Philadelphia, Pa.

August 31–September 2, Conference of Health Officers and Public Health Nurses, Saratoga Springs, N. Y.

September 30–October 2, International Union Against Tuberculosis, Washington, D. C.

October 4–7, National Tuberculosis Association, Washington, D. C.

October 4–9, American Library Association, Atlantic City, N. J., and Philadelphia, Pa.

October 11–14, American Public Health Association, Buffalo, N. Y.

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